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CHINA.

VOL. III.

CHINESE FORTUNE-TELLER.

OLIVER & BOYD, EDINBURGH.

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AN

HISTORICAL AND DESCRIPTIVE

ACCOUNT

OF

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CHINA;

ITS ANCIENT AND MODERN HISTORY, LANGUAGE, LITERATURE, RELIGION, GOVERNMENT, INDUSTRY, MANNERS, AND SOCIAL STATE; INTERCOURSE WITH EUROPE FROM THE EARLIEST AGES; MISSIONS AND EMBASSIES TO THE IMPERIAL COURT; BRITISH AND FOREIGN COMMERCE; DIRECTIONS TO NAVIGATORS; STATE OF MATHEMATICS AND ASTRONOMY; SURVEY OF ITS GEOGRAPHY, GEOLOGY, BOTANY, AND ZOOLOGY.

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ROYAL ASIAT

WITH A MAP, AND THIRTY-SIX ENGRAVINGS BY JACKSON.

IN THREE VOLUMES.

VOL. III.

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THE deep interest that China justly excites arises chiefly from viewing its population, its government, society, and industry, all of which appear on so grand a scale, and under such peculiar aspects.

The local features indeed possess the same character of vastness which generally distinguishes the empire. Her provinces equal our kingdoms, her towns our capitals, her villages most of our cities; yet all these are pervaded by a certain sameness approaching to monotony. He who has seen one town may, in some measure, be said to have seen all. They are of a square or quadrangular form, surrounded by high walls, defended and ornamented by towers at regular distances. The streets, extending usually from one extremity to the other, are filled with an immense multitude of human beings, and bordered by richly-embellished shops. Those inhabited by the lower ranks are confused, crowded, and dirty; while the mansions of the great are generally enclosed, and display no external magnificence. The ornamental structures consist chiefly of pagodas, and such as are called triumphal arches, the number and splendour of which being proportioned to the extent of the city; but all are built nearly on the same plan and style of design.*

As for these reasons the local details of China possess only a limited claim on our curiosity, there is less room to regret the very slender means by which it can be gratified. Our knowledge is derived almost entirely from missions and embassies, conducted in one or two directions between the coast and the capital, under strict official guidance, and with the most jealous care, in order that the members should see and hear as little as possible. Regis, Jartoux, and other missionaries, indeed, who were employed above a century ago by Kang-hi upon a general survey of the empire, and whose map has

* Du Halde, vol. i. p. 108.

been found tolerably correct, must have possessed much better opportunities. They, however, either met with little variety, or did not possess the art of observation; for the descriptions which Du Halde, in his History of China, has drawn from their materials, are meagre, vague, and often exaggerated.

In the present chapter we shall not repeat the details already given, in following the routes of successive ambassadors and missionaries to and from the capital; but, from the sources now indicated, we shall endeavour to condense into a small compass a general view of the component parts of this vast and populous region.

It must be observed, that the Chinese, after dividing the empire into provinces, have subdivided these into districts, each dependent on one of the great cities. These last, according to their importance and the extent of their jurisdiction, are arranged in three classes, expressed by the terms *fou*, *tcheou*, and *hien*, usually annexed to their names; as, Kai-fong-*fou*, Lan-*tcheou*, Yuen-*hien*.

The governor of a city of the first rank is called Che-fou, and has under his administration a number of cities of the second or third rank. He must be a mandarin of the fourth order, and is allowed three assistants of inferior dignity. The cities of the second rank have a governor, called Che-tcheou, who is a mandarin of the fifth order, with two assistants. He is, in general, subordinate to the che-fou, though sometimes only to the Tsong-tou or viceroy. In some instances he has several *hien*, or cities of the third rank, under him; but more commonly the jurisdiction is entirely separate, and the *hien* depend directly upon the *fou*. Their governor, called Che-

hien, must be a mandarin of the seventh order, and employs two subordinates: he receives his instructions sometimes from the che-tcheou, but more usually, as stated above, direct from the che-fou. There are in China 173 fou, 335 tcheou, and 1173 hien.*

In presenting a tabular view of the provinces, drawn from the best sources that could be procured, we must acknowledge that these are by no means so precise as could be desired. In regard to population, we have already shown the uncertainties and contradictions in which that subject is involved.† It might, indeed, have been expected, that the statements would afford at least a tolerable idea of the relative amount in each province; but here, too, the discrepancies are very remarkable. The most complete and distinct lists yet produced are those of Allerstain, Staunton, and Mr Morrison,—the first of which appears to us to approach nearest to the truth, both in its general amount and in its particular details. In it the ruder provinces of the west show that inferiority which might be expected; though in Se-tchuen this, we apprehend, is much too great. The revenue, taken from Staunton, expresses only the payments into the treasury, which, as elsewhere remarked, by no means include the whole amount; but the account is probably so far accurate, and may give a good comparative idea of the provincial contributions. The territories on the frontier, however, and those harassed by independent tribes, must require a large military force, which, increasing the local expenditure, will reduce the remittances. The list of cities is collected from Du Halde, and being

* Du Halde, vol. i. pp. 2, 3, 7, 8; vol. ii. p. 43.
† Supra, vol. ii. p. 248.

founded on the missionary surveys officially reported, is, it may be presumed, nearly correct, though it does not exactly correspond with the total number above quoted.

Provinces.	Extent, according to Sir G. Staunton, in square miles.	Population, according to			Revenue in Taels.	Number and Description of Cities.	
		Allertais.	Staunton.	Morrison, jun.		Fou.	Tcheou & Hien.
Pe-che-lee,	58,949	15,891,792	38,000,000	27,990,871	3,056,000	9	140
Shan-tung,	65,104	25,180,754	24,000,000	28,958,764	5,600,000	6	114
Shan-see,	55,268	9,768,189	27,000,000	14,004,210	3,722,000	5	85
Kiang-nan, Kiang-su, Gan-hwuy,	92,961	23,161,409 22,761,050	32,000,000	31,845,501 34,168,059	8,210,000	14	93
Tche-kiang,	39,150	15,429,692	21,000,000	26,256,784	3,810,000	11	77
Kiang-see,	72,176	11,006,646	19,000,000	30,426,999	2,120,000	16	78
Ho-nan,	65,104	16,332,570	25,000,000	23,057,171	3,215,000	8	102
Hou-quang, Hou-pe, Hou-nan,	144,770	8,080,605 8,829,320	14,000,000	27,370,098	1,310,000	8	60
Quang-tung,	79,456	6,797,597	13,000,000 21,000,000	18,652,507 19,174,030	1,345,000 1,340,000	7 10	67 84
Fo-kien,	53,480	8,065,671	15,000,000	14,777,410	1,277,000	9	60
Quang-see,	78,250	5,947,414	10,000,000	7,515,895	500,000	12	80
Shen-see, Kan-su,	154,008	7,287,445 7,412,014	18,000,000 12,000,000	10,207,256 15,195,125	1,700,000 340,000	4 4	80 50
Se-tchuen,	166,800	2,782,976	27,000,000	21,455,678	670,000	10	58
Koei-tcheou,	64,554	5,102,722	9,000,000	5,288,219	145,000	10	38
Yun-nan,	107,969	2,078,802	8,000,000	5,561,320	210,000	21	55
	1,297,999	198,214,624	335,000,000	367,699,897	36,548,000	161	1351

This geographical survey of the Chinese provinces may be rendered more clear and concise by dividing the empire into four parts, each of which appears to possess a peculiar and distinctive character. These are,—1. The Northern Provinces; 2. The Central; 3. The Southern; 4. The Western.

1. The northern provinces are PE-CHE-LEE, SHAN-TUNG, and SHAN-SEE. Their boundaries, generally speaking, are, on the north, the Great Wall, separating them from Tartary; on the east, the Yellow Sea and Gulf of Pe-che-lee; on the south and west, the great stream of the Hoang-ho or Yellow River. They consist of very extensive plains, rising on the north and west into mountains or high tableland, which form the lower declivity of the lofty chain that traverses Mantchoo Tartary. The win-

ter, as elsewhere noticed, is extremely rigorous, compared with that of European countries under the same latitude; so that all the rivers, not excepting the largest, are then frozen. Hence, though the summers are proportionally hot, the more valuable articles of rice, silk, and tea, which constitute the pride of Chinese culture, cannot be reared; even wheat does not successfully resist the cold, and millet is therefore the standard grain. The high grounds wear somewhat of a pastoral aspect, and support several domestic animals, which have been banished from the more cultivated provinces. The fine manufactures that distinguish China are also unknown, though there are some remains of the woollen fabrics in which she anciently excelled. The mineral products consist of iron, large quantities of coal, with lapis-lazuli, and other varieties of beautifully-coloured stone.

Pe-che-lee, which separates the two other provinces, is the most northerly, bordering on the Tartar dominions, but not reaching south to the Hoang-ho. It is extensive, and ever since the year 1411, in the reign of Yong-lo, the third emperor of the Ming dynasty, has been the seat of government. It was first recommended by its proximity to Tartary, whence hostile incursions were to be constantly apprehended; and ever since the monarch has belonged to that country, the same local convenience has rendered Pe-che-lee the residence of the imperial court. Its general aspect must be familiar to our readers who have followed the route of successive embassies, particularly of the Dutch and English from the south, and of the Russians from the north. It answers to the general description already given,

consisting of a wide, somewhat naked plain, rising gradually to the Tartar frontier, where it becomes decidedly mountainous, though the chain is never very elevated till after passing the barrier of the Great Wall.

This province is chiefly distinguished for its cities, among which it numbers the capital of the empire. Pe-king has been so minutely described that our readers must have a tolerable idea of its general appearance, as well as of its principal ornament, the imperial palace and gardens. It is divided, as in the time of Marco Polo, into the Chinese and Tartar cities, the abode of the conquerors and of the conquered. But, though separated by walls from each other, these parts are both enclosed within one general rampart, about eighteen miles in circumference. All the great cities are fortified in the same manner; still the bulwarks of Pe-king are higher and stronger, its towers loftier, and its gates more richly ornamented, than those of any other.* The population of this great capital, nowhere reported on official authority, has been estimated by different observers, but not without those discrepancies which are so perplexing to inquirers into Chinese statistics. Le Comte, Gaubil, and Timkowski, have fixed upon two millions as nearly approaching to the real number. The members of Lord Macartney's embassy were of opinion that it might be stated at three millions. Malte Brun and other writers have regarded this amount as greatly exaggerated, insisting that it ought to be reduced to 600,000 or 700,000. M. Balbi, without however stating his reasons, has given the medium estimate of 1,300,000.

* Du Halde, vol. i. p. 113-116.

Pe-king, it has been said, does not cover a greater extent of surface than Moscow; but the site of the latter includes much uninhabited ground, and the little accommodation with which the lower orders of the Chinese are contented, as well as the practice of several families residing under one roof, cause them to occupy smaller space than almost any other people. We incline to believe, therefore, that the number of two millions, assigned by the three first authorities, may be considered as approaching nearest to the truth. Pe-king, in that case, is considerably larger than London, and can be rivalled only by Nan-king, in its claim to rank as the greatest capital in the world.

There are other important cities in this large province. Pao-ting-fou, the second in order, and the residence of the viceroy, is described as an agreeable place, situated in a fine country, on the highroad leading westward into Shan-see. Probably, however, it is much surpassed in magnitude, as well as importance, by Tien-sing-fou, the grand emporium of the Pei-ho and of Northern China. This is one of the towns best known to Europeans, and has repeatedly come under our observation. The same may be said of Tong-tcheou-fou, which, though decidedly inferior, derives great consequence from being the port of Peking, where the numerous commodities transmitted from the southern provinces are landed and conveyed to the capital, from which it is about twelve miles distant.

Shan-tung is also a large and important province, south-east of that now described. It is partly composed of a bold promontory, stretching into the ocean, and bounding on one side the Gulf of Pe-che-lee. The western and inland portion is a plain of vast

extent, southward from that of Pe-che-lee, and somewhat more fertile. The Grand Canal, or Yun-ho, stretching from north to south, traverses this province, and adds greatly to its importance. The mountainous tracts are much less known; yet one route was traced through them by the Dutch embassy, while the seacoast was observed by that under Lord Macartney. The general result seems to be, that though the mountains are rugged, they are interspersed with fertile valleys under high cultivation. The fruits are said to be peculiarly delicate; game is more plentiful than in the lower districts; and a considerable quantity of wild silk is produced. Waterfowl and fish abound in the rivers and lakes along the line of the canal. This part of China, in ancient times, formed an independent state, named Lou, memorable for having given birth to Confucius, the great philosopher and lawgiver.

Tsi-nan-fou, the capital, is situated considerably eastward of the Grand Canal, in a mountainous though fertile country. It did not lie in the track of any of the embassies; but the missionaries describe it as large and handsome, with manufactures of cheap and durable silk. Tong-tchang-fou, Yen-tcheou-fou, and Lin-tsin-tcheou, derive importance from their being on the line of that great internal navigation. Ten-tcheou-fou and Lae-tcheou-fou, near both of which Lord Macartney sailed, from their position on the Gulf of Pe-che-lee, have become the seats of a busy coasting-trade.

Shan-see is a smaller province west of Pe-che-lee, enclosed between it, the Great Wall, and the Hoang-ho in its progress first south and then east. This tract is mountainous, but abounds in the ruder pro-

ducts of the northern districts. Its mineral wealth is valuable, particularly the coal and iron; it yields also marble, lapis-lazuli, jasper, and other species of beautifully-coloured stone.

Tai-yuen-fou, the capital, is finely situated on the Fuen-ho, which, watering this province from north to south, falls into the Yellow River; and though the palaces of the princes who once made it their residence are fallen into decay, it is described as still large and populous. Farther south, and lower down the same river, is Pin-yang-fou, said to be scarcely inferior in any respect to the provincial metropolis. Fuen-tcheou-fou, also on the Fuen-ho, about midway between the two towns just mentioned, is likewise large and flourishing. Tai-tong-fou is a strong city on the mountainous border of the empire, and in the vicinity of the Great Wall.

2. The central provinces consist of KIANG-NAN, TCHE-KIANG, KIANG-SEE, HO-NAN, and HOU-QUANG. The first and the last have each been divided into two; yet the original appellations of both are still retained, and form decidedly the finest part of the empire. All its most valuable productions, all its finest fabrics, are here reared or manufactured. When China had two courts, Kiang-nan contained the southern one, which was by much the more splendid; and though the imperial capital has for many ages been situated in the north, it is supplied from the central provinces with all its materials of pomp and luxury. This territory consists, with little interruption, of an immense plain, through the midst of which flows the Yang-tse-kiang, perhaps the noblest river of the Old World. The numerous tributaries which fall into it from both sides, as well

as those flowing northwards to the Hoang-ho, render it one of the best-watered regions upon earth, completely exempted from that aridity which converts so many tropical countries into wastes. Indeed, the excess of moisture, as it renders some districts marshy, is the chief disadvantage under which it labours.

Kiang-nan is the province in which the riches and beauty of this part of China are most amply displayed; all the products of nature and art being carried to a perfection unequalled in any other. The rice and wheat are excellent; the silk is rivalled only in Tche-kiang; cotton is nowhere so good. The song-lo, or green tea, the most delicate of that species, grows only on the hills of Kiang-nan. The people are said to be more intelligent, and learning is cultivated with greater assiduity. The cities, though they have long ceased to possess a court, continue, amid neglect and decay, to present a gayer aspect, and to be adorned with more splendid structures, than any other in the empire. As its population doubles that of most other provinces, it has in modern times been divided into Kiang-su, the north-eastern, and Gan-hwuy, the south-western section, which are separated for the most part by the Yang-tse-kiang. The former division, occupying the space between the great rivers, is the most extensive and fertile, and contains more splendid cities.

Nan-king, "The Southern Court,"—a name given to it when it was the capital of China, and by which it is yet generally known, though its official title has been changed to Kiang-ning-fou,—appears to be still the finest city in the empire. Its circuit is more ample than even that of Pe-king;

but a full third consists now only of empty ground; and, though it has lost the court and all the institutions connected with government, yet its manufactures continue to flourish. The satins, the cotton-cloth bearing its name, the ink and paper, are superior to any made elsewhere. It is, moreover, the literary metropolis of the empire; its learned men are the most distinguished, and its libraries the most extensive. Among its remarkable edifices is the Porcelain Tower, which has been already described. We think this city must, in the days of its greatness, have been more populous than Pe-king, and, allowing it to have lost a third, M. Balbi's estimate of 500,000 appears much too low: we should incline to rank it still, in this respect, not much inferior to its rival.

Kiang-nan contains other great cities, most of which have been formerly noticed. Sou-tcheou-fou, though not so large as Nan-king, is more gay and beautiful, and, with its environs, is regarded as the paradise of China.* By the Woo-sung it communicates with the harbour of Shang-hai, the extensive commerce of which has been elsewhere described; and Hoai-ngan-fou, near the mouth of the Yellow River, of which it is the port, also derives from it a great trade. A department here established has the general charge of the embankments, canals, and other operations connected with the vast lines of water which traverse the empire. Yang-tcheou-fou, near the junction of the Grand Canal with the Yang-tse-kiang, and Ngan-king-fou, situated considerably up the river, not far from the Po-yang Lake, are great commercial stations. Fong-yang-

* Supra, vol. i. p. 177.

fou, to the north-west of Nan-king, was founded in the fourteenth century by Hong-vou, who destined it for the capital of the empire. Other views determined him to fix his residence elsewhere; yet it is still a considerable place, adorned with some splendid though partly unfinished structures. Hoei-tcheou, the most southern city, is said to be very opulent and devoted to merchandise.

Tche-kiang, the rival of Kiang-nan, forms in a great measure a continuation of the same vast plain, equally fertile and beautiful. In particular, it is completely pervaded by rivers and canals, covered with innumerable barks. All the tropical productions flourish here to a great extent; but that of silk is particularly distinguished for abundance, and a quality superior, if possible, to that of Kiang-nan. The southern part of the province, however, is encroached upon by the great chain of mountains from Quang-tung and Fo-kien; but they are either cultivated to the summit, or covered with valuable forests of bamboo.

Hang-tcheou-fou, the capital, so celebrated by Marco Polo under the name of Kin-sai, has come repeatedly under our observation. Although long deprived of the lustre arising from imperial residence, its commerce and manufactures still rank it with the greatest cities of China. Silks, particularly flowered taffetas and different kinds of satin, are its peculiar staple. It communicates by canals with its great ports of Ning-po and Sha-poo, which we have already had occasion to notice. Kia-hing-fou and Hou-tcheou-fou, the latter on the banks of the Tai Lake, are inland towns, and great emporia of the silk-trade. Kin-hoa-fou, Yen-tcheou-fou, and Kiu-

tcheou-fou, are smaller places, agreeably situated among the mountains; the first is said to have been very beautiful, till the Tartars, enraged by an obstinate resistance, destroyed a great part of it. Chaohing-fou is large, situated on a most delightful plain, and watered by canals. It has been compared to Venice, which it greatly resembles.

Kiang-see is an extensive province south-west of those now described, and reaching to the mountain-boundary of Quang-tung. It is profusely watered by numerous streams, uniting in the Kan-kiang, which, traversing it from south to north, forms the Po-yang Lake, and then empties itself into the Yang-tse-kiang. A great portion is highly productive, especially in rice and sugar. It is bordered, however, on the south by very rugged mountains; and a considerable space is covered by water, or by marshes unfit for cultivation. The rivers and lakes abound in fish and waterfowl, and in that aquatic plant, the *lien-wha,* which is peculiarly valued by the Chinese. It shares in some degree the manufactures of the neighbouring provinces; but is, at the same time, chiefly distinguished for the finest porcelain, which is exclusively confined to King-te-tching, one of its towns.

Nan-tchang-fou, on the lower course of the Kan-kiang, is a fine city, capital of the province. It suffered severely in the Tartar invasion, but has now nearly recovered, and is the great emporium of the porcelain-trade. The seat of this manufacture, as has just been noticed, is King-te-tching, which, though not surrounded by walls, nor holding the rank of a city, surpasses all the rest in importance. It has been asserted, though probably with exagge-

ration, to contain a million of inhabitants. It stands on a river in a plain flanked by high mountains, and the streets are regularly built, though narrow and crowded. The approach is announced by volumes of rising smoke; and at night it appears like a town on fire, or a vast furnace emitting flame by numerous vents. The porcelain, fabricated in the manner already described, is conveyed by numerous boats to Yao-tcheou-fou, on the Po-yang lake. Along the banks of the Kan-kiang, rendered considerable by its trade, are Lin-kiang-fou and Ki-ngan-fou. Kan-tcheou-fou, situated at the point where the stream ceases to be navigable, is thus become a seat of busy commerce, and compared by the French missionaries to Rouen. Merchandise, however, can still be conveyed in boats to Nan-ngan-fou, where it is landed and transported over the lofty mountain-chain that separates this province from Quang-tung. Fou-tcheou-fou, which stands on a tributary of the Kan-kiang, draws its prosperity from the fertile country by which it is surrounded; while Nan-kang-fou is chiefly distinguished by its situation on the Po-yang Lake, at the base of a lofty picturesque mountain.

Ho-nan lies to the west of Kiang-nan, nearly in the heart of the empire, between its two great rivers, the Hoang-ho and Yang-tse-kiang; and, in reference to this central situation, the natives call it "The Flower of the Middle." Our knowledge of this fine province is very imperfect, as it has not been much visited by European travellers. The missionaries extol, in high though general terms, its beauty and fertility, which have procured for it the appellation of "The Garden of China." It ap-

pears, like other central provinces, to consist chiefly of a vast champaign country, though bounded on the west by high mountains covered with forests. Its products are copious and varied, though none of any peculiar character; nor is much said of its manufactures, which, we may conclude, are less considerable than those of the districts last described.

Kai-fong-fou, the capital, is situated at a short distance from the south bank of the Hoang-ho, in a most fruitful plain, but subject to the disadvantage of lying lower than the river, and being thus exposed to inundation. Our readers will remember, that it has been mentioned as the proud metropolis of the kingdom of the Kin, comprehending the northern half of China; as also the calamities which it endured from successive sieges by the Mongol conquerors.* It never rose again to equal splendour; but its losses had been greatly retrieved, when, in the middle of the seventeenth century, it was attacked by the rebel army which laid waste the empire previous to the Tartar invasion. The imperial general, unable otherwise to raise the siege, broke down the dikes by which the river was retained within its banks; by which expedient the city was completely inundated, and a vast number of its inhabitants destroyed. It has however been rebuilt, and, from its favourable situation, has again become rich and populous. Ho-nan-fou, though large, and bearing the name of the province, is of inferior importance; while all the other cities in this agricultural region are of secondary magnitude.

Hou-quang is an extensive district, reaching from the boundary of Ho-nan to the great southern

* Supra, vol. i. pp. 100, 107.

chain which separates it from Quang-tung and Quang-see. Mountains also, on the west, intervene between it and Se-tchuen; and even a rugged chain on the east divides it from Kiang-see. Yet the interior consists of an immense and highly fruitful plain; and the Alpine boundaries serve only to vary the produce by the addition of timber, fruits, medicinal plants, and valuable metals. Upon the whole, Hou-quang has been represented as abounding, beyond any of the other provinces, in every natural product that can minister to the use of man. No mention, indeed, is made of manufactures; but, by the great channel of the Yang-tse-kiang and its tributaries, the fruits of its soil can be easily exchanged for the fine fabrics of Kiang-nan and Kiang-see. This large and populous province has in modern times been divided into two, nearly separated by the river Yang-tse-kiang. That on the north, called Hou-pe, contains the finest territory and the largest cities; the southern, named Hou-nan, is the more extensive. They are ruled by separate governors, over whom a viceroy presides.

The capital of Hou-pe, and the residence of the viceroy, is Ou-tchang-fou, on the south bank of the Yang-tse-kiang; while on the opposite side is Han-yang-fou. These two, strictly speaking, form only a single city,—one of the most extensive in China, or even in the world. Han-yang-fou is named from the river Han, which, after watering a great part of the province, here joins the Yang-tse-kiang, the magnitude of which is strikingly displayed in its being, though nearly 500 miles from the sea, still a league broad, with a depth sufficient for the largest ships. The channel of these two rivers is said to be covered

with an uninterrupted forest of masts, the number of vessels being estimated at 8000 or 10,000, including, of course, every kind of small-craft. King-tcheou-fou and Hoang-tcheou-fou are also flourishing emporia on the great river, one above and the other below the capital, which the former has even been represented as rivalling. Ngan-lo-fou and Siang-yang-fou are pleasantly situated in fertile districts upon the Han.

In Hou-nan, the southern division, the finest cities are those situated near the great lake of Tong-ting, which, fed by numerous streams, extends over a space 250 miles in circuit, and is remarkable for its valuable fisheries. Tchang-tcha-fou, the capital, communicates with it by the river Heng, which waters nearly the whole of the eastern portion of the province; and the neighbouring district, enjoying in the most complete degree the benefits of irrigation, is extremely productive. Yo-tcheou-fou, in consequence of its situation at the junction of the lake with the Yang-tse-kiang, becomes the emporium for numerous commodities. Tchang-te-fou lies on the river Yuen, near the above lake. Tching-tcheou-fou on the west, Heng-tcheou-fou and Yong-tcheou-fou, to the east and south, are smaller cities, near the mountainous borders of the province; but the territory is still agreeable and fertile.

3. The southern provinces are composed of QUANG-TUNG, commonly called CANTON, FO-KIEN, and QUANG-SEE. A decided character is given to this division by that extensive mountain-chain which has been already described as prolonged from the Himmaleh along the whole south of China, with an elevation diminishing in its progress eastward.

These provinces consist of the level country intervening between the sea and this chain, which forms a steep barrier, separating them from the rest of the empire. High ranges also shoot across them, and terminate in rugged cliffs that breast the tempestuous waves of the Pacific. In the intervals, however, are many valleys and even extensive plains, that rival the finest of the central provinces, and are cultivated with equal diligence; though they yield no peculiarly rich productions, except the bohea tea, reared on the hill-slopes of Fo-kien. The manufactures are various, and actively pursued; yet none of them can match those of Nan-king, Hang-tcheou-fou, and King-te-tching. The coast, at the same time, is the seat of nearly all the foreign trade of the empire. Its position relative to the Eastern Peninsula and Archipelago, its fine harbours, even the ruggedness of many of its districts, seem to have united in turning the industry of the people into this direction. Canton is the well-known seat of the trade with Europeans, and their possessions in India; while the Chinese junks, sent to the neighbouring coasts and islands, are almost all fitted out from the ports of Fo-kien. We have indeed observed, that a bolder and more enterprising race, addicted to maritime adventure and even to emigration, inhabit these shores. In convulsed periods, they have been noted for the most daring acts of piracy; but since the full establishment of the Tartar dynasty, the corsairs have been rooted out, and confined to some of the smaller islands scattered at short distances along the coast.

Quang-tung, the most important of these provinces, answers nearly to the general description

already given. It comprises a large extent of coast, having a breadth varying from one to two hundred miles between the sea and the mountains. These are here very lofty, the chief pass over them being, as elsewhere stated, about 8000 feet high; and branches from them traverse the country in rugged and picturesque forms. The plains, however, are extensive and fruitful, and the territory on the whole very productive. The sea abounds with fish, while the numerous bays and estuaries are covered, with streets of floating mansions, inhabited by families who derive all their subsistence from the waters.

Quang-tcheou-fou, the Canton of Europeans, is the capital of this province, and one of the greatest emporia of the East. It is seated at the confluence of rivers from the west, the north, and the east, by which it communicates with every part of the adjacent country. The united streams spread into a broad estuary, broken by numerous islands into winding passages, the principal of which, called by Europeans the Bocca Tigris, leads up to its port. The city is said by the French missionaries to occupy nearly as much ground as Paris, and is closely built; so that, though the population can only be conjectured, we should consider M. Balbi's estimate of half a million rather under than above the truth. It is surrounded by a thick wall, is nearly in the form of a square, and is divided into two parts by another wall running east and west. The suburbs are of an extent sufficient to form a large European town. Canton, besides its trade, has extensive manufactures, and one species of silk-stuff is said to be fabricated of very superior quality.

The factories of the Europeans are spacious structures, situated without the walls, and ranged along the water. The English house is particularly large and commodious, affording, according to Mr Barrow, a more comfortable residence than the most splendid palace of which the empire can boast.* It is built in a style of mixed Oriental and Western architecture; and an elegant veranda commands grand views up and down the river. The beach is covered with vast piles of goods which have been landed from the country-boats, ready to be transferred into others for conveyance to the ships at Wham-poa. The crowd of clerks and porters running to and fro, and vociferating to one another; the numberless boats upon the water, crowded with people, pigs, and poultry, render this, in Mr Wathen's opinion, the most tumultuous and noisy scene in the whole world; the buzz is deafening and almost intolerable.—A literary spirit pervades this remote colony; a copious and well-selected library has been formed, with a commodious reading-apartment, every fleet bringing out new publications and journals. Europeans are prohibited from entering the walls of Canton; but the suburbs are open to them, and afford in abundance every necessary and luxury which the country produces. China Street, immediately adjoining the factories, consists entirely of shops arranged expressly for their accommodation. Within the city, the dealers in each commodity have a street or quarter appropriated to them; but here the various articles suited to foreign demand are displayed together, and in the most advantageous form. The scene, which

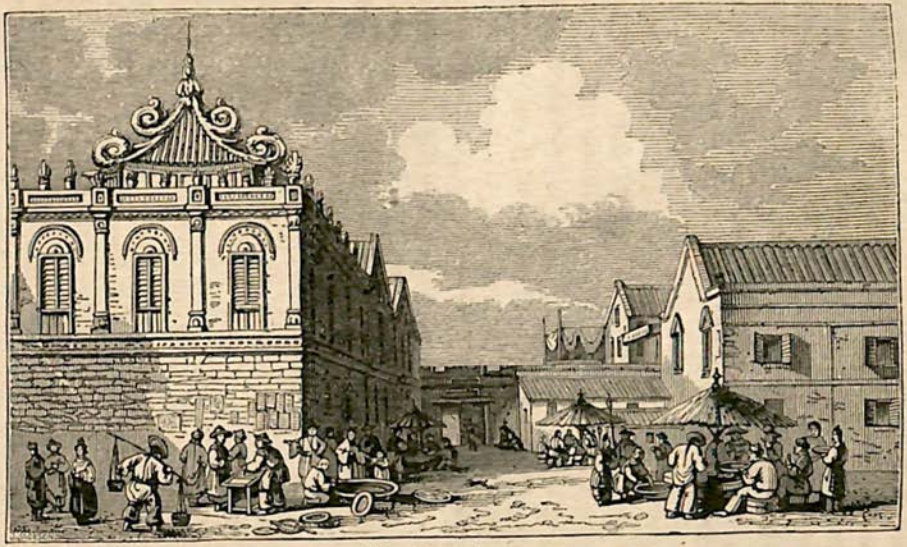
* Travels, p. 609.

includes almost an epitome of Chinese life, is represented in the annexed cut, from a drawing by a friend of Captain Dalrymple. The English gentlemen have liberty to make short excursions into the country, or to the shores of the river and bay, which present in many places agreeable and beautiful prospects. Sumptuous entertainments are given to them by the Hong-merchants, and they even receive visits from the hoppo or chief officer of revenue; but they seldom or never see the greater mandarins, who affect to hold in contempt every thing connected with commerce.*

In the approach to Canton by the Bocca Tigris, at the distance of twelve or fourteen miles, is the fortified station of Wham-poa, above which no European vessels are permitted to ascend. Here, also, is a chop-house, as it is called, where even boats are subjected to strict examination. Farther out, on the western side of the entrance, the Portuguese settlement of Macao, scarcely eight miles in circuit, lies on a small peninsula projecting from a territory called an island, though separated from the continent only by river-channels. This city, though it has lost its early importance, is still handsome and well built, and according to Staunton contains about 12,000 inhabitants, of whom more than half are Chinese; but other authorities raise the number to 30,000, and even higher.† The government interdicts strictly all communication with the country; a wall being built across the isthmus, and closely guarded, which the Portuguese are never allowed

* Wathen's Voyage to Madras and China (4to, London, 1814), pp. 185-187, 192, 193, 196-198, 200, 206.

† Abeel, Journal of a Residence in China and the Neighbouring Countries from 1830 to 1833 (12mo, London, 1835), p. 35.



China Street, Canton.

to pass. They are, indeed, reproached as extremely subservient, and are defended by a garrison of not more than 300 black soldiers. The government, having so closely hemmed them in on this little spot, seem to have ceased to consider it as part of the Celestial Empire, and allow the English and other foreign merchants to place their families there, while they can proceed to Canton only for purposes of trade. The peninsula is rocky, and the cliffs are of varied and highly picturesque forms, presenting from their summit magnificent views of land and sea. A chasm in the loftiest of these formed the cave of Camoens, on a stone seat in which that most illustrious of the Portuguese poets was accustomed to sit and compose. It is still held in reverence, though Mr Ellis, with some reason, doubts the good taste of enclosing it by an abutment of masonry. On a spot of broken ground adjoining is his garden, still cultivated, and filled with beautiful trees and shrubs irregularly disposed.* On the opposite side of the Bocca Tigris is the island of Lintin, already mentioned as the seat of a most extensive contraband trade.

Canton is by no means the only great city in the province. Fo-chan, a kind of suburb to it, about twelve miles distant, has been represented as almost as large. Tchao-king-fou, farther to the westward, on the Ta-ho, is very handsome and well built, and is the residence of the viceroy who presides over this province and that of Quang-see. From it to Canton, along the river, the range of buildings is almost uninterrupted. Chao-tcheou-fou and Nan-yong-fou, on the Pe-kiang, lie on the great

* Wathen, p. 170-173. Staunton, vol. iii. p. 432-438. Ellis, vol. ii. p. 204.

line of commerce from the principal port to the central and northern districts, and are enriched by this transit-trade.

Fo-kien is situated east of Quang-tung, following the direction of the coast, which here turns considerably north. The mountain-chain which forms the boundary of both these provinces stretches in the same direction; but its elevation is here sensibly diminished, while its rugged cliffs almost every where reach the shore, giving to it throughout a broken and variegated aspect. These are interrupted in general only by narrow fertile valleys, though in the interior extensive plains have been observed. The territory is throughout under the most careful cultivation, and the fruits, especially that called *li-chi*, are said to be peculiarly delicate; yet the products of the soil are comparatively so deficient as to have probably some effect in giving to the genius of the people that direction towards maritime commerce which so strikingly distinguishes them. The situation of Fo-kien, relative to the neighbouring countries, its deep bays and fine harbours, all favour this pursuit; and under its influence has been formed, as already observed, a bold and adventurous race.

In following the progress of Lindsay and Gutzlaff along the coast of Fo-kien, we have become acquainted with its general aspect, as well as with the most remarkable seats of trade. Fou-tcheou-fou, near the mouth of the Min-kiang, the residence of the viceroy of this province and of Tche-kiang, and Amoy, the chief emporium of foreign commerce, have been pretty fully described. Tchang-tcheou-fou and Suen-tcheou-fou (Chin-tcheou) are also considerable ports. Yen-ping-fou is agreeably si-

tuated on the upper part of the Min, and above it is Kien-ning-fou, a place of great trade; while Pou-tching-hien, lying near the mountain-border, where that river ceases to be navigable, has ample occupation in transferring the goods that pass to and from the coast. Eighteen thousand porters are said to be employed in this labour.

Quang-see extends westward of Quang-tung as far as Yun-nan and the kingdom of Tonquin. The great mountain-chain, bounding it to the north and covered with forests, is loftier and more rugged than in the eastern provinces, and contains a race of brave but barbarous people, who set at defiance the power of the empire. The interior comprises a wide plain, watered throughout by the Ta-ho and its tributaries, and is very productive in rice, of which a large quantity is exported to Canton. The absence of manufactures, of which no mention is made, may be one cause of this surplus in grain. The mineral wealth is considerable. The inhabitants, even those who are under regular subjection, are represented as less civilized than in the other provinces.

Kouei-ling-fou, the capital, is situated on the mountainous border, being probably fixed there with a view to watch over the independent tribes. Ou-tcheou-fou on the Ta-ho, near the frontier of Quang-tung, is the most considerable place, through which the trade is chiefly carried on.

4. The western provinces, bordering on Tartary, are, SHEN-SEE, SE-TCHUEN, KOEI-TCHEOU, and YUN-NAN; but our knowledge of them is more imperfect than of any other quarter. They are not, indeed, separated from the rest by any decided natural boundaries, if we except the southward

course of the Hoang-ho, dividing Shen-see from Shan-see. Elsewhere the same grand features of mountain and river are prolonged eastward as far as the ocean. Yet, according to every description hitherto received, their aspect, productions, and social state, differ very widely from those of other parts of the empire. The mountains are much loftier. Those stupendous chains, the Himmaleh, the Kwan-lun, and the Teen-shan, though lowering gradually from their greatest height in Hindostan and Tartary, retain still an elevation which gives to this part of China a decidedly Alpine character. Their recesses are occupied, to a great extent, by the Miao-tse, Lolos, and other independent, almost savage, tribes. This region, however, is not altogether steril or unproductive; there are some extended plains; and the mountains are generally interspersed with rich and beautiful valleys. Animals, even of a wild description, are in considerable numbers. The store of metals and minerals is particularly ample, including gold and silver, though greater value is set on copper. The rivers afford commodious channels for transporting those articles through the whole empire.

Shen-see, the north-western province, projecting in some degree into Tartary, is full of mountains; yet these are every where diversified with fertile well-watered tracts, and not so rugged as to give shelter to independent tribes. The climate is agreeable, though too cold for the production of rice and silk, the place of which is supplied by wheat and millet. On the hills are rhubarb and other medicinal plants; and among the numerous wild animals is the one which yields musk. The great road from the capital through this country,

carried in many places by high bridges from rock to rock, and across deep ravines, proves that the Chinese, when circumstances oblige them to substitute this species of communication for that of canals, spare neither labour nor skill in making it complete. Shen-see is pointed out, by traditions seemingly authentic, as the cradle of their civilisation; and, notwithstanding its remote situation, the inhabitants are said to be distinguished by a somewhat superior degree of refinement.

Si-ngan-fou, the capital of Shen-see, is described by the missionaries as a very large city, though it is probable that they exaggerate greatly when they represent it as holding the second rank to Pe-king. It contains many monuments of the earliest dynasty of princes, who reigned in this part of the empire. Han-tchong-fou, according to the same authority, is also large and flourishing.

The western portion of this province, with some adjacent districts, has lately been erected into a separate government, named Kan-su. According to notices, which are, however, indistinct, it appears to resemble Shen-see, having the same rude features on a larger scale,—more mountainous, and with fewer fertile tracts. Lan-tcheou, though ranking only as a city of the second order, is the place of greatest importance, through which the commerce with Tartary, consisting chiefly of hides and coarse woollens, is carried on by way of Si-ning. Ping-leang-fou and Kong-tchang-fou are populous; while King-yang-fou is strongly fortified, and considered one of the barriers of the empire.

Se-tchuen, south of Shen-see, is an extensive province, but is very imperfectly known. Its moun-

tain-border, indeed, is very lofty; yet a great portion consists of a continuation of the vast central plain, watered by the Yang-tse-kiang. It combines the tropical products of silk and sugar with the musk and rhubarb of Tartary. The minerals appear to be valuable. Salt-springs, yielding that substance in abundance, though not of the very best quality, are useful, from the great distance whence it would otherwise be necessary to obtain a supply.

Although this province is not so generally mountainous as that of Shen-see, its ranges, especially those which border on Koei-tcheou and Yun-nan, are still more rugged, and have been the chief retreat of the boldest and the fiercest of the independent tribes. Those called the Miao-tse were divided into two races,—the Great and the Little Kin-tchouen, whose chiefs owned a certain allegiance to the emperor, accepting from him investiture, with titles and presents, but ruling in fact by hereditary right, and with high feudal power. About 1770, in the reign of Kien-long, these two clans engaged in a bitter warfare with each other, in the course of which frequent incursions were made into the civilized districts. The Governor of Se-tchuen sent a mandate that each party should lay down their arms, otherwise force would be employed to compel them; whereupon both, equally offended with this interference, made peace and combined for mutual defence. His excellency, sensible that he had engaged in an undertaking to which his local resources were inadequate, reported the circumstances to Kien-long. That enterprising prince, who had extended the empire in several directions, felt indignant that any tribe within its limits should set his will at de-

fiance; yet the attempt to reduce these hardy mountaineers had long been considered desperate. Ouen-fou, a chief, undertook it with 10,000 men, and at first carried all before him, but being entangled in intricate defiles, was surprised and cut off with nearly all his troops. Kien-long then nominated to the command A-koui, a mandarin of secondary rank, who had greatly distinguished himself in the wars of Ava and Tartary. This chief divided his force into several corps, and directing them first against the Little Kin-tchouen, entered the country at different points, so as completely to hem in their detachments; and he thus gradually penetrated into the heart of their territory, which he completely subdued. The Great Kin-tchouen, however, were still unconquered, and prepared for the most desperate resistance; the whole population, including even the women, taking up arms. A-koui applied himself in the same persevering and determined manner to this war, in the course of which many brave officers and men perished, either on the field or by torture. Several entire bodies were cut off, and the roads were for some time covered with funeral processions, conveying the dead to their native districts. Yet, in spite of every obstacle, the Chinese general reached the capital, which he besieged and at length reduced; but the king had fled to Karai, a strong fortress, in a site almost inaccessible, so that another tedious campaign was necessary before it could be invested. Seeing himself, however, shut up in his last bulwark, he made overtures for peace, promising that if allowed still to rule his people, he would acknowledge himself the vassal of Kien-long. A-koui replied, that he would be per-

mitted to reign over them on his own terms, though not amid the same mountains; on the contrary, he and they must remove to a distant part of China, where they would no longer possess the same means of resistance. But in such rude breasts local attachment is deep and unextinguishable. The unhappy prince deemed it better to perish on his native soil than to be a sovereign in another. He held out to the last extremity; but was at length obliged to surrender at discretion, when he, his court, and ministers, were transported to Pe-king, to await the sentence of the emperor. The treatment they at first received led to the expectation of mercy; but Kien-long soon showed that he had no generous sympathy with a brave and fallen enemy. The doom was pronounced, that the king, with nineteen others, including his aunt A-tchim, denounced as a firebrand of rebellion, and two priests, were to be cut in pieces; nineteen beheaded; sixteen imprisoned for life; and fifty-two banished. The people were carried away and distributed in servile colonies over distant parts of the empire.* Amiot considers them extinct as a nation;† yet recent experience has shown that independent tribes, in great numbers, still lurk in the same mountain-borders.

Tching-tou-fou, the capital, was celebrated as one of the finest cities in China till the great civil war in the middle of the seventeenth century, when it was nearly destroyed. The most flourishing places are those on the Yang-tse-kiang,—Koei-tcheou-fou near the eastern frontier, with Tchong-king-fou and Soui-tcheou-fou, each situated at the junction of a

* Mémoires, tome iii. pp. 392-401, 412, 413.
† Ibid. tome ii. p. 415.

great tributary. Several places on the western frontier, though only of secondary rank, are important as fortresses and bulwarks of the empire.

Koei-tcheou, to the south of Se-tchuen, is a smaller province still less improved, being almost entirely traversed by mountains separated from each other by a few fruitful valleys. Notwithstanding its southern situation, silk and other tropical productions cannot be raised; but the best horses in the empire and various other domestic animals are bred in it. On many of the mountains timber grows abundantly, and the mines of mercury and copper are valuable. The ruggedness of the surface has given occasion to a display of ingenuity in forming communications, more especially a bridge of iron chains covered with planks,—a species of structure only recently introduced among Europeans. The cities, not excepting Koei-yang the capital, are described as small, and distinguished neither by wealth nor splendour.

Yun-nan, the most southerly and also the most westerly province, bordering on Thibet and the Birman empire, is very extensive, and, according to report, presents a singular variety of mountain and valley. It has a more alpine character than any other part of China, being traversed by the great southern chain prolonged from the Himmaleh, not far from where it shoots up the loftiest peaks in the world. It is hence said to be the richest of all the districts in metals and minerals, comprising gold and very fine copper, while in musk it almost rivals Thibet. Yet these high tracts alternate with some extensive and finely-watered plains, where, beneath a tropical sun, the most delicate productions are

reared, including rice, silk, and even a species of tea, already mentioned as much valued by the natives, though unknown in Europe.* The mountain-tracts are generally tenanted by a race called Lolos, who appear to be aborigines, and are independent of the emperor, though they nominally own his supremacy. They are described as less unpolished than the Miao-tse, and *living* in perfect subordination to their chiefs. Though they worship Boodh, it is neither under the appellation of Fo, nor after the forms usual in the empire, but entirely according to those which prevail in Ava and Pegu.

This province is not much distinguished by its cities. Yun-nan-fou, the capital, suffered much during the last Tartar invasion; and though situated on a fine lake, and carrying on a great trade in metals, it does not reach the first magnitude. The country adjoining Ta-li-fou abounds with the variegated marble so much valued throughout the empire. Near King-tong-fou is a chain-bridge similar to that already described. Yung-ning-tou-fou, on the border of Thibet, derives some wealth from the woollen manufactures for which this country is distinguished.

The *islands* comprehended in the Chinese dominions, though forming only a small portion of their vast extent, are not undeserving of notice.

Hai-nan is considerable; being estimated by Captain Horsburgh at about fifty-five leagues in length and twenty-six in breadth. A narrow channel separates it from a peninsula of the province of Quang-tung. A great part, especially along the northern shore, is level, and has been occupied by the inha-

* Supra, vol. ii. p. 212.

bitants of the coast, who raise there the same productions as in their own province, with the addition of indigo. The interior, however, is rugged, and almost entirely possessed by a very rude race, whom the settlers rarely attempt to disturb in their wild haunts. This quarter contains fine ornamental woods, lapis-lazuli, and a considerable quantity of gold, which is made by the natives into ornaments, though the trade is prohibited by the imperial government.

Formosa is a larger island east from Fo-kien, to which it is attached. It is about 250 miles long and 80 broad. High mountains extend along its eastern tracts, numerous streams from which irrigate and render extremely fertile the great plain on the west. The natives bear no resemblance to those of China, and have apparently more alliance with the Polynesian tribes. They tattoo their persons fantastically, adorning them with rings, beads, and feathers. Their habitations are merely huts of clay and bamboo, roofed with straw, and containing only mats and a couch of leaves. They cultivate some rice, but subsist chiefly by hunting, in which they use bows and arrows with great dexterity. This island seems to have scarcely attracted the attention of the Chinese till about the middle of the sixteenth century, when it became the stronghold of a formidable pirate named Lin-tao-kien, whom we have seen mentioned by the early Spanish missionaries under the name of Li-ma-hon. Afterwards, in the seventeenth century, when the empire was generally conquered by the Mantchoo Tartars, Tching-tching-kong, called by the Dutch Koxinga, rallied round him all

his countrymen attached to the native dynasty, and made this island, with the opposite coast of Fo-kien, the centre of a powerful maritime state. We have seen the steps by which, with the aid of the Dutch, it was finally put down.* The imperial government then occupied the island in great force; and its natural resources becoming thus known to an industrious people, numerous colonies settled there, and have rendered it as productive and populous as any of the adjacent provinces. The natives have either been expelled from this quarter, or reduced to a condition little superior to that of slaves. They still occupy the mountainous districts, either paying a tribute to the conquering race, or living entirely independent.

The other islands along the Chinese coast are mostly disposed in groups, and are numerous but very small. We may mention the Ladrones, opposite Macao, still the dreaded haunt of pirates; the Piscadores, noted for the attempt made by the Dutch to form a settlement there; the beautiful cluster of the Tchu-sans, with the adjoining one of the Que-sans, and the fertile Tsung-ming. But almost every thing important that is known respecting these insular territories has been included in our narrative of the voyages of Macartney, Lindsay, and Gutzlaff.

* Vol. i. pp. 190, 243, 249.

COMMERCE.

CHAPTER II.

View of the Trade with China.

The British Trade with China thrown open—The Chinese an industrious People—Export-trade of China; Tea, Silk, Sugar, &c.—Manufactured Articles—Bullion largely exported—Imports from British India; Opium, Cotton-wool, &c.—From the Eastern Islands, Siam, &c.—British Trade—American Trade—Dutch, French, and Portuguese Trades—Native Trade by Junks—Great Facilities for trading to Fo-kien—Commercial Character of its Natives—Value and Importance of the Foreign Trade of China—Principal Emporia; Canton, Macao, Tchao-tcheou—In Fo-kien; Amoy, Fou-tcheou—In Tche-kiang; Ting-hai (Tchusan), Ning-po, Hang-tcheou, Sha-poo—In Kiáng-nan; Shang-hai—In Shan-tung; Kaeou-tcheou, Ten-tcheou—In Pe-che-lee; Tien-sing—In Mantchoo Tartary; Kin-tcheou, Kae-tcheou—In Formosa; Tay-wan, Ke-lang-tching—Commercial Policy of the Chinese Government—Modes suggested for conducting the Trade—Contraband Trade—Hong-merchants—Port-charges; Duties—Weights and Moneys—British and other Establishments at Canton—Tariff of Tea-duties—Concluding Remarks.

THE commerce of the Chinese empire is at length thrown open to British enterprise;—our merchants and manufacturers, with their accustomed spirit, have already embarked largely in it,—and the nation is likely to reap great advantages from an active intercourse with the most intelligent, the most industrious, and the most numerous people of Asia. We propose, in this chapter, to give the reader a concise

view of the present state and future prospects of this important trade. Although the legal termination of the monopoly took place only on the 22d of April 1834, its virtual opening has been long in progress by means of what has been called the "country-trade" between India and China, chiefly through the medium of Sincapore. This gradual change has been brought about by the cessation, for these few years, of every branch of the Company's import-trade, except that in tea, and more indirectly by the merchants of the United States of America, who have not only afforded funds for facilitating business, but have also, during the last fourteen years, exported manufactures direct from England to a very considerable amount. The trade, therefore, is entered upon with a considerable stock of experience and information. Although the population of China be not stationary, but on the contrary advancing, it is still true that the country is overpeopled; and this is made manifest by the high price of food, the low rate of wages, the misery of the humbler classes, and the emigration which yearly takes place, contrary to the fixed laws of the empire. This emigration is very remarkable, and consists exclusively of adult males, who cannot on the whole, we think, be estimated at less than forty thousand annually. They proceed, as far as our information extends, from five provinces only: Quang-see, Kiang-nan, Tche-kiang, Quang-tung, and Fo-kien; but by far the greatest number from the two last provinces.

The Chinese, upon the whole, live under the best government and the wisest laws of any people in Asia. The tranquillity which has reigned in their vast dominions for more than a century,—the in-

crease of population which has taken place, the superior manufacturing skill, and the greater activity in almost every department, which distinguish this people beyond all other Asiatic nations,—are substantial proofs of this assertion. They possess considerable physical strength, and, being inured to toil from childhood, they labour indefatigably. Generally speaking, it is not an exaggeration to state, that in ordinary work, but especially in every species of handicraft, one Chinese is equal to four of our Indian subjects. The merchants and other men of business are acute, methodical, and enterprising. Among the lower classes of tradesmen, it is true, chicanery is not unfrequently practised; but among the higher order of dealers, extensive commercial intercourse produces its usual effect of a regard for character, and hence these are in general punctual as well as faithful to their engagements. Here, as in every other country of Asia, the greatest share of roguery is to be found amongst the public functionaries; and from the highest to the lowest these persons may be described as extremely corrupt and rapacious. This is not to be wondered at; for their salaries are paltry or but nominal, and the greater number of them purchase their places as a mere commercial speculation.

In pursuance of the object now before us, we may remark, that the most correct view, at least of the commercial resources of China, will be conveyed to the reader by a detail of its exports and imports, which, therefore, we proceed at once to give, beginning with *tea*, which is by far the most important of them. It is the leaf of a shrub, the *Thea bohea*, which, in the eye of an ordinary observer, is not unlike a myrtle. It is produced in greater or smaller

quantity in almost every province in China, except the most northerly, in the same manner that wine is produced in almost every district of France; but the more excellent kinds, like the finer wines, are confined to a few localities. Until of late years, the whole of the black tea was brought from the province of Fo-kien, and the whole of the green from that of Kiang-nan; but the cultivation of green tea for exportation is now extended to Tche-kiang, and of black to Quang-tung. The merchants generally begin to arrive in Canton early in October, with the crop of the season; though, with the exception of the kinds most in demand, teas may be had throughout the year. The ordinary descriptions are thirteen in number; each, however, differing in itself both in price and quality. They are as follows, with their prices, taken from the Canton Price-current of the 14th of November 1833,* which may be considered as the height of the season:—

Tea.	Per Pecul.
Bohea,	12 to 15 Taels.
Congo,	22 28
Campoi,	22 28
Souchong,	22 40
Caper,	22 25
Orange Pekoe,	23 25
Pekoe,	45 75
Ankoi Souchong,	21 23
Hyson,	46 55
Hyson-skin,	27 30
Hyson, young,	44 48
Gunpowder,	59 62
Twankay,	28 32

The value is here estimated in the Chinese money,

* This date is preferable to a more recent one, for giving an average of all periods; because, in the height of the last season (1834-5), there was a temporary advance of ten or twelve per cent. upon the usual prices, consequent upon the great demand caused by the opening of the trade. This will not continue.

or rather weight, called the tael, which varies with the rate of exchange, but, for convenience, may be taken at six shillings; and the weight or pecul is equal to 133⅓ lbs. avoirdupois. The lowest price of congo, therefore, according to the quotation above given, was nearly a shilling per pound. The first eight teas in the above list are black, and the five last green. These two kinds are permanent varieties of a plant of which there is but one species, in the same manner as red and white grapes are permanent varieties, and not distinct species of one plant, the *Vinis vinifera*. All the differences in quality are occasioned by soil, climate, modes of culture or preparation, and the several periods at which the harvest is reaped. The finest teas, in reference to the last circumstance, are the produce of the early leaf-buds, and the coarsest, of the old and full-grown leaf. Pekoe alone, the highest-priced of the black varieties, has its flavour enhanced by mixing with it a few blossoms of the fragrant olive (*Olea fragrans*), whence it is called by us white blossom or flowery pekoe, and by the Dutch *bloem te*. At the commencement of the present century, the total quantity annually exported from China did not probably exceed thirty millions of lbs.; the consumption of Great Britain and Ireland, by far the largest, being short of twenty-five millions. We apprehend that at present the exports do not fall short of fifty millions,—an increase of two-thirds in a period little exceeding thirty years. At the termination of the first year of the free-trade, there were shipped from Canton, for the United Kingdom alone, upwards of forty-three millions of pounds weight; but it is probable that the quantities exported by the other

European nations, and by the Americans, were considerably short of their exportations in previous years; their markets being much better stocked than that of Britain, which was under-supplied through the monopoly. Green teas were scarcely cultivated at all until the taste of the European nations stimulated the natives to do so; they now form about one-third part of the whole exports; meanwhile no permanent increase has taken place in the price. We state these decisive facts with the view of showing that the supply is equal to the demand, and that no apprehension whatever need be felt for a rise in China.

Besides the teas exported to Europe and America, a considerable quantity is sent to the British possessions in India and Australia, and a much larger to every country of Asia which contains Chinese emigrants; such as Tonquin, Cochin-China, Cambodia, Siam, the Philippines, Java, Borneo, and various settlements within the Straits of Malacca. The Russians, who are prohibited from trading with the Celestial Empire by sea, receive their supply over land; as do all the Tartar nations, who have acquired a great taste for this article. The consumption of the country itself is of course immense. Every district, generally speaking, produces its own supply, though only the finest teas are consumed by the wealthy. The tea-plant to the Chinese is, in a great measure, both in culture and use, what the vine is to the people of the south of Europe; what the aloe or agave is to the South Americans; what palms are to the inhabitants of intertropical regions; and what coffee is to the Arabians. The total value of the fifty millions of pounds, which we suppose to be

exported from Canton, may be reckoned at about two millions and a half sterling.

The article next in importance is raw silk. This is raised and manufactured in four provinces; namely, Kiang-nan, Fo-kien, Tche-kiang, and Quang-tung. It is to be observed of this commodity, and indeed of most others in the production of which skilful industry is required, that the supply from the provinces beyond the tropic is much superior in quality to what is obtained from those within it. The silks brought to the market of Canton are those of Kiang-nan or Nan-king, and of Quang-tung only; and the first is generally double the value of the last. There is no article which shows in a manner more remarkable than this the capacity of extended production possessed by China. In the fifteen years ending with 1823-24, the average exports by the East India Company (and they were the sole exporters) were barely 94,000 lbs. weight, and in the last-named year they were short of 80,000 lbs.,—amounts which were supposed to express the whole disposable produce of the empire. In 1834, however, the trade having been above ten years in private hands, and the article brought to Europe through the medium of Sincapore, the exports rose to 1,322,666 lbs., being an increase of between sixteen and seventeen fold. It is to be remarked, that this augmentation in the export has produced no sensible advance in the Chinese price of the article. The quantities here stated refer only to the exports to England; but these form by far the most considerable part.

The next article, if rated according to its importance, is sugar, which is of two descriptions,—clayed or soft, and sugar-candy; this last being the

nearest approach to the refined commodity yet made by the nations of the East. Thé only manufactures for foreign trade are in the two provinces of Quang-tung and Fo-kien; and, in so far as refined sugar at least is concerned, the produce of the former is fully 75 per cent. better than that of the latter. In 1831, the total quantity exported was 8036 tons; viz., of clayed sugar, 5392, and of candy, 2644; the value of the first being £111,622, and of the last, £78,873; of both, £190,495. In former times, the shipping of this production was confined to a small quantity sent to the western coast of India, and it is only within the last twenty years that it has been brought to Europe.

Nan-king cloth still continues to be exported in large quantities; and in point of strength, durability, and essential cheapness, is unrivalled by any of the cotton-fabrics of Europe,—an advantage which it probably owes, in a good measure, to the excellence of the raw material. The best is the produce of Kiang-nan or Nan-king, from which it takes its name; and an inferior description is manufactured in Quang-tung. It is either white, blue, or brown; the last being the result of dye, and not the natural colour, as vulgarly supposed. The quantity got up for the foreign market is very variable; under the British flag alone, in 1831, there were conveyed 925,200 pieces, valued at £107,323. In later years, the quantity has been much smaller; and in 1834, it had fallen to 65,900 pieces. Manufactured silks, notwithstanding the improvement made in this branch of industry in Europe, and particularly in our own country, still continue to be largely exported from China. The principal purchasers are the

Americans, who, in 1831-32, purchased to the value of 1,668,389 dollars; and even the English, in 1831, bought to the extent of near £100,000 sterling. In 1834, the value of manufactured silks exported by our countrymen was 332,844 dollars, while that by the Americans had dropped down to a million of dollars (1,032,063). The principal provinces where the manufacture is conducted are Kiang-nan, Tche-kiang, and Fo-kien; but it has also been introduced of late years into Quang-tung.

Cassia-lignea and cassia-buds are the produce of the forests of Quang-tung and Quang-see. In 1834, the exports of cassia-lignea by the British amounted to 2,347,600 lbs. weight, and by the Americans to 1,468,933; making a total of 3,816,533; the price in Canton being about threepence per lb. This cheap commodity is rapidly substituting itself for the superior but high-priced cinnamon of Ceylon; the subject heretofore of a monopoly, and now of an excessive duty levied by the local government. When the trade with China was close, the Dutch first, and then our India Company, used to sell, at from ten to twelve shillings, nearly a million pounds of cinnamon. This quantity is now reduced to about 450,000 lbs., and the price to less than half,—a rate, however, by no means sufficiently low to sustain a competition with cassia.

Camphor, like cassia, is the produce of a species of laurel; and like it, too, is found in the forests of Quang-tung, and in smaller quantity in those of Fo-kien and Formosa. The quantity exported varies much from year to year. Under the British flag, there were conveyed, in 1833, as much as 670,000 lbs. weight; but this was double the amount of the

export of some former years, and even of the export of 1834, which was only 324,000 lbs. Rhubarb, the produce of the northern provinces of Shen-see and Se-tchuen, is an article of considerable value, and the same may be said of musk, which is collected in Se-tchuen, Shen-see, and Yun-nan. There are likewise brought to the market of Canton, aniseed (*Pimpinella anisum*), China root (*Smilax China*), turmeric (*Amomum zerumbet*), *hartal* or orpiment, that is, the yellow sulphuret of arsenic, galangal or galanga root, and cinnabar. Orpiment is procured in the mines of Yun-nan, and cinnabar or native vermilion, in those of Shen-see, Hou-quang, and Shan-see.

The superior industry of the Chinese people, as compared with other Asiatic nations, is proved by their extensive exportation of manufactured articles. To those already enumerated the following may be added,—alum, white-lead, red-lead, brass-leaf, tutenague or zinc, false-pearls, glass-beads, paper, paper-hangings, toys, table and floor mats, and china-ware, with the precious metals. Alum is prepared in the distant province of Kiang-see, which supplies, we believe, the whole East with this mineral. In British bottoms alone there were exported, in 1831, above a million and a half of lbs.; but it is probable the junks carry away to the various settlements connected with the empire a larger quantity. Tutenague or zinc, obtained from the mines of Yun-nan, used to be largely exported, until German spelter, a less pure but much cheaper article, was introduced about the year 1822, and has nearly superseded it. The paper of China, supposed to be manufactured from bamboo-cane, is brittle from the too copious

use of alum, and is greatly inferior to the European fabric; but being much cheaper than this last, it is used even in our Indian settlements for all ordinary purposes. The Chinese porcelain, which was so largely exported before the western nations borrowed the art, is still an important article of commerce. It furnishes, indeed, all the inhabitants of the Eastern Islands, from Sumatra to the Philippines, and the tribes from the western border of China to the eastern frontier of the Birman country, with the principal portion of their culinary vessels; even the Persians and Arabians make use of it, receiving their supplies by Bombay. The quantity annually bought by the British does not exceed in value eight or nine thousand pounds, but the Americans purchase to a much larger amount. It may be mentioned, that the total value of manufactured articles exported by the English and Americans in 1834, excluding from this computation raw silk, refined sugar, and gold and silver bullion, exceeded two millions of Spanish dollars (2,125,671).

Canton, besides exporting native productions, is also an entrepôt for those of the neighbouring countries, and occasionally even for the manufactures of Europe, India, and America. Among these may be mentioned, mother-of-pearl shell, tortoise-shell, cloves, canes, and rattans; dragons-blood and cubebs, the produce of the Eastern Islands; gamboge, the produce of Cambodia; saltpetre and opium, the produce of India; and cochineal and copper, the produce of the new world.

Within the last twenty years, bullion has been very largely exported from China,—an unprofitable branch of commerce, which will probably in a great

measure cease when the trade has assumed a more rational basis. We shall give here the quantities of silver sent to different countries in British shipping during the years 1830, 1833, and 1834 respectively, as affording a tolerable index of the intercourse with each.

	1830.	1833.	1834.
London,.....	961,439	2,132,936	155,730
Calcutta,.....	2,575,931	1,074,553	1,929,931
Bombay,.....	2,995,617	1,479,250	3,854,280
Sundry places,.....	213,385	140,016	277,879
Total, dollars...	6,746,372	4,826,755	6,217,820

Besides the silver exported in 1834, gold was shipped to the value of 513,795 Spanish dollars, making the whole amount of the British exports in bullion, in that year, at the exchange of 4s. 3d. per dollar, £1,430,468,—an enormous sum, affording a sufficient indication of the unnatural state of the trade. Of the silver bullion exported in 1830, the proportion of native silver, commonly called sycee silver—the produce of the mines of Kiang-see, Quang-see, Yun-nan, and Koei-tcheou,—was 1,681,567 dollars, and in 1834 no less than 5,119,304; to this sum, however, must be added the export of gold, also native; and we shall have a total export of the precious metals, the produce of China, equal to £1,197,035. This is not only a striking proof of the industry of the Chinese, but we may conjecture from it, that the production of the precious metals in different parts of the empire is equal to one-sixth of that of North and South America and of the Russian mines,—a fact till now little suspected in Europe.

We turn now to the imports, which we shall divide into the trade of Continental India,—the trade of the Eastern Islands and neighbouring countries

of Siam, Cochin-China, and Tonquin,—the trade of Europe,—and the trade of America. With regard to the first, by far the most important article is opium, though the use of this well-known drug is strictly prohibited by the laws. For this reason, although there can be no question that many parts of the empire are, both in soil and climate, well suited to the production of the opium-poppy, while the cheapness of labour would render the manufacture profitable, yet the whole consumption, which is now vast, and still increasing, is at present supplied from Bengal, Malwah in the centre of India, and Asiatic Turkey,—the emporium for the last being Smyrna. The production of opium in Bengal is a government-monopoly; the growth of the poppy being chiefly confined to some districts in the provinces of Bahar and Benares, much in the same way in which the tobacco is confined in France to a few places, with a view to the security of the crown-imposts. In Malwah, the manufacture is free, but a heavy inland duty is levied upon it, which, with the high profit derived from the monopoly in Bengal, may produce a revenue to the British government of about a million sterling. In order to give the trade of China its full extension, this privileged system should be abolished, and the local duties levied every where should be exceedingly moderate; for the increased consumption would soon amply compensate the reduced rate of impost and high monopoly profits. The Turkish opium used by the Chinese does not exceed a thousand chests a-year, which, compared with the amount of the Indian, is of small importance. In 1817-18, the quantity of the latter imported into the empire

was 2435 chests, each of about 150 lbs. weight. In 1822-23, it had increased to 6000 chests; in 1824-25, it exceeded 7000; in 1825-26, it was upwards of 9000; in 1827-28, it was more than 10,000; in 1831, it exceeded 16,000; and in 1833, it was 23,693. The following statement of quantities and values, which describes, not the importation, but the actual consumption, will, however, be more satisfactory:—

Seasons.	Patna.			Benares.			Malwah.			Total.	
	Chests.	Aver. dol.	Amount dollars.	Chests.	Aver. dol.	Amount dollars.	Chests.	Aver. dol.	Amount dollars.	Chests.	Amount dollars.
1827-8	4006	1005	1,019,550	1128	980	1,105,805	4,401	1201	5,299,920	9,535	10,425,075
1828-9	4851	947	4,574,650	1150	911	1,029,585	7,171	966	6,928,880	13,152	12,535,115
1829-0	5561	867	4,820,448	1579	812	1,329,129	6,857	862	5,907,580	14,000	12,057,157
1830-1	5085	870	4,451,809	1575	848	1,535,395	12,100	588	7,114,059	18,760	12,904,263
1831-2	4442	974	4,324,845	1518	954	1,448,195	8,265	704	5,818,574	14,225	11,591,614
1832-3	6110	798	5,115,120	1880	774	1,455,603	15,403	570	8,781,700	23,693	15,352,429

The imports for the season 1834 amounted to above 20,000 chests; which was a diminution of about 3000; it may, however, be supposed a mere temporary decline. The particulars would have been given, but that the classification does not exactly agree with that of the preceding years.

The total value of the opium consumed in China, in 1817-18, amounted to 2,951,100 Spanish dollars; so that, in the short period of fifteen years, it had increased between five and six fold, and the quantity had multiplied nearly tenfold; the price, meanwhile, having declined about one-half. The consumption of Indian opium in 1833, estimated in British money, was £3,262,391; and if we add a thousand chests of Turkey opium, with probably about 200 chests conveyed by the junks to other ports besides Canton, we may estimate the whole consumption at three millions and a half sterling. This is probably the largest sum given for any raw article supplied by one nation to another, if we

except the cotton-wool furnished to Great Britain by the United States. The use of this narcotic, too, is constantly extending; and it is difficult to conjecture to what limits the trade might be carried under favourable auspices. Even the great consumption of 1833, it may be remarked, gives for the whole population of the empire little more than seventy grains a-head per annum. It occurs to us, that it may be possible to introduce among the Chinese the *sulphate*, or other neutral salt, of *morphia* as a substitute for crude opium, which, in its present state, is a manufacture of about the same degree of refinement as pitch or tar. The opium, before it is smoked by them, is known to be boiled and purified; the result of which process has been ascertained, by a chemical analysis, to be no other than a rude morphia. Now, if the well-prepared article, which contains the essence of the drug in about one-sixteenth part of the weight of the raw material, could be introduced, many advantages would follow: —it would be cheaply and conveniently transported to China with little risk of seizure,—the natives would be saved their own imperfect and wasteful operation,—and they would be supplied with a more wholesome commodity, which might be conveyed to them at a smaller cost than even the precious metals. Britain also would become the seat of a new and extensive branch of manufacture,—for we cannot suppose that in any other country it could be conducted so advantageously. Certainly the participation in a rising branch of trade which, even at present, gives employment to three millions and a half of British capital, and is obviously capable of a very great extension, is well deserving of national consideration.

Two objections have been urged against the opium-trade; namely, that it is discreditable as an evasion of the national law of China, and that the drug is deleterious to the health of the consumers. These are easily answered. If the Chinese government impose absurd rules,—if they set themselves in opposition to the practice of other countries—and above all, if they make laws which they have no power to enforce, and which even their own subjects openly set at defiance, they must take the consequence of their folly. The fact is, that the sovereign, and especially his principal officers, do not expect that their decrees on this head are to be obeyed, and they enforce them only partially, and for the purposes of extortion. With respect to the deleterious quality of the drug, we consider this opinion to be a mere prejudice; for opium, as it is prepared by the consumers, when taken in moderation,—and it is much more rarely taken in excess than ardent spirits, or malt liquor, or wine, in European countries,—seems in no respect more pernicious than any of these intoxicating beverages. It is, in fact, not the use but the abuse which is hurtful. Men of all ages and countries solace their cares with some intoxicating material or other; and whether this be brandy or wine, as in France, ale, as in England, whisky, as in Ireland, fermented mare's milk, as in Tartary, the expressed juice of hemp, as in some parts of India, or opium, as in China, is a matter of comparative indifference,—depending on the taste, habits, or caprices of a people.

The next article of importance conveyed from British India to China is cotton-wool. This is one of the oldest branches of the trade between those great countries, and was by far the most considerable,

until opium took the lead. The cotton is imported from Bombay, Madras, and Bengal; the first being much the greatest in amount, but the lowest in quality; and the second the smallest in amount, but the best in quality. The market for this production is not supposed to extend beyond the province of Quang-tung and the neighbouring one of Quang-see, and the extent of the transactions, though fluctuating from year to year, may now be considered as nearly stationary. In 1831, the total imports amounted to about sixty-five millions of pounds weight, of which the value was 5,013,898 dollars, or rather more than a million sterling. It has been stated, and we believe with some truth, that the cotton-wool carried thither is chiefly made into quilting-cloths, to be used as winter-dresses. It may be remarked, that the cotton fabrics of India have never found a market in China. They seem unsuited to the taste of the people, who have no fancy for fine muslins; while the ordinary cottons of that country are neither so substantial nor durable as their own, nor so much cheaper as to create a demand.

The other articles imported from Hindostan, besides opium and cotton-wool, are of very inferior importance and value; they consist of black pepper in small quantity, from Malabar, *Cutch* or *terra-japonica*, from Pegu, being the inspissated juice of the mimosa or *Acacia catechu*, myrrh, and olibanum, or frankincense, productions of Arabia, asafœtida, procured in Persia, putchuck, the root of a plant which grows in Gujerat, and used as incense, saltpetre, sandal-wood, sharks-fins, fish-maws, cow-bezoar, pearls from the Persian Gulf and Gulf of Manaar, and cornelians from Gujerat. Saltpetre is

an article of which the import has considerably increased of late years; though, being contraband, or at least vendible only to the government, it is commonly disposed of at Lintin, one of the islands near the entrance of the estuary of Canton, and already mentioned as the chief seat of the smuggling trade.

The imports from the Eastern Islands and neighbouring countries are very various, and may be enumerated as follows:—

Bêche de Mèr.	Cubebs.	Gambir.
Betel-nut.	Gamboge.	Rattans.
Malay Camphor.	Tortoise-shell.	Sandal-wood.
Nutmegs.	Mangrove-bark.	Tin.
Elephants-teeth.	Bees-wax.	Dragons-blood.
Sharks-fins.	Birds-nests.	Mother-of-pearl Shells.
Pepper.	Cloves.	Gold.
Rice.	Ebony.	Eagle-wood.
Sapan-wood.	Fish-maws.	Benjamin.

The first article in this list, bêche de mer, sea-slug, or *holothurion*, is a very peculiar substance, and considered as a luxury much in the way in which we regard caviare. It is brought from almost every island of the Eastern Archipelago, from Australia, and of late from the Mauritius and Ceylon. The value, as may be seen by the Canton Price-current, varies, according to quality, from six dollars up to fifty per pecul; and the natives alone, for the most part, are judges of its worth. The principal importation is by the junks, and the quantity is so considerable, that the fishery of it, especially on the coast of New Holland, where it abounds, might probably be entered into with advantage by Europeans. Fish-maws and sharks-fins are supplied not only from the west of India, but from the islands; and we perceive that stock-fish from Eu-

rope is of late years regularly quoted in the Price-current,—a fact which suggests the probability of making the market of China ultimately available to our cod, herring, and other fisheries. Betel-nut, or the nut of the areca-palm, an abundant and consequently a very cheap commodity, is imported to a considerable amount; the British alone, in 1830, brought not less than 2500 tons, valued at about £20,000; but the greater portion, we suspect, is conveyed by the junks. The peculiar luxury of the swallows-nests, considered by the Chinese as highly restorative, is almost exclusively in the hands of native traders, and carried from the islands of Java and Borneo. Malay camphor, the produce of the *Dryobalanops camphor*, growing in Borneo, Sumatra, and the Malayan Archipelago, fetches in the market of Canton a price equal to about one hundred times that of the article made from their own *Laurus camphora*. The former is far more fragrant than the latter; but whether it possess any superior virtues is exceedingly doubtful. The oil of the *Dryobalanops*, which is as agreeable as the concrete substance, and almost as cheap as spirits of turpentine, is held in no esteem. If by any ingenious contrivance it could in Britain be reduced to a concrete state, as has lately been done with the oil of the cocoa-nut, the produce might be advantageously exported to China, and perhaps retained in part for home-consumption. The finer spices of the Moluccas,—cloves, nutmegs, and mace, but particularly the first, form a considerable article of commerce in the empire. Even the cloves of the Mauritius are quoted in the Canton Price-current, but at a price generally one-third less than those of the Moluccas.

The chief supply of black pepper is from Sumatra, the Malayan Peninsula, Borneo, and the east coast of the Gulf of Siam. The largest importation observed by us of this article in British vessels, is about 2000 tons, which is itself double the consumption of the United Kingdom. But the Chinese have it for use, including duty, for about 4d. the pound, while we pay at least four times as much; the price, when untaxed, being nearly the same in both countries. The greater part of the pepper consumed by that people is furnished by the junks, and chiefly by those which trade with Siam,—a country in which it is extensively produced for exportation.

China, like every other country which is densely inhabited, is deficient in the supply of timber and dye-woods. The neighbouring countries, therefore, which are in a rude state, furnish it, in the same manner that America and the north of Europe supply England, France, and Holland; and if capital were abundant, and freights low, they would export a much larger amount. The supply of wood and other rude produce from the surrounding countries, is a branch of trade into which we think it not improbable that the British merchant will sooner or later enter. The timber furnished at present consists chiefly of fancy-woods; as sandal-wood, from Malabar, the Sandwich and Feejee Islands; that of the first is nearly three times as valuable as those of the two last, being of greater size, and containing more essential oil. The English and Americans, in 1834, imported of this commodity about 300 tons, worth 50,000 Spanish dollars. Rosewood comes from Siam, and ebony from several of the Malayan Islands, but the best as well as the

largest quantity of late years has been sent from the Mauritius, while an inferior kind is brought from Ceylon. The woods or barks for dyeing, consist chiefly of sapan-wood from Siam, and the barks of several species of *Rhizophora*, or mangrove, from the Malayan Islands. Under this head may be mentioned rattans and canes, of which the importations, both by native and European vessels, chiefly from Borneo, Sumatra, and the Malayan Peninsula, are very large for such a commodity. We perceive that of the former, the weight imported by British ships, in 1830, was equal to 35,000 cwt., valued at about £18,000.

Owing to the vast population of China, and its consequent pressure on the means of subsistence, the value of rice is commonly double in Canton what it is in the neighbouring countries. Corn is not only high-priced, but the empire is also liable to dearths and famines, arising from violent floods or droughts, or the destruction produced by locusts, and the absence of a foreign trade that might supply a deficiency in years of scarcity. The government, in respect to the importation of this article, adopts an unusually liberal policy, exempting all ships with full cargoes of it from port-charges, and from the greater part of the customary fees. The countries from which it has been usually brought are Java and the Philippines; and we perceive that cargoes have recently been sent from Sincapore. Indeed, under favourable auspices, this promises to become a considerable branch of trade. In 1834, the quantity imported in British vessels was 15,406 tons, and in American, 7,412; making a total of 22,818 tons; valued at 724,252 dollars, equal to £153,903 sterling. This, we re-

peat, is a branch of trade likely to become of vast importance; for it is at present in its infancy.

Although no less than eight of the provinces of China yield tin, yet the supply is inadequate to the demand, and it has for a long time formed a staple article of import. The countries which furnish this commodity are, the island of Banca and various states of the Malayan Peninsula, extending from the first to the tenth degree of north latitude. The metal from the former, being more carefully smelted, bears generally a somewhat higher price. The largest quantity which we observe imported in any one year in British vessels was rather more than 1000 tons, valued at about £70,000 sterling; but it fluctuates greatly, and we perceive that in 1833 it was not above one-third of the amount just stated. With the exception of gold, supplied by Borneo, Celebes, Sumatra, and the Malayan Peninsula, and copper from Japan, tin is the only metal which the Eastern Islands, or indeed any country of Asia, furnish to the Celestial Empire.

Of the imports from Europe the most important are iron, steel, lead, spelter or zinc, and quicksilver; woollens, cotton-goods, and cotton-twist; the minor articles being cudbear, smalts, flints, tin-plates, clockwork, and machinery. The introduction of iron from our quarter of the globe is comparatively recent, though the Chinese iron is greatly inferior to that of Europe. At one time they exported to the Eastern Islands, Siam, and other neighbouring countries, a considerable number of cast-metal pots; but these have recently been superseded by a much cheaper article from Siam, where ore and the wood to smelt it are more abundant, and also by far better

goods than either regularly sent from England. The quantity of bar and rod iron and steel imported by us and the Americans, in 1834, was about 3000 tons. The pig-lead in the same year amounted to nearly the same quantity. Three of the provinces of China possess lead-mines, and the supply appears to be considerable, although unequal to the demand, as much of it is used in the lining of the tea-chests, of which the consumption increases rapidly every year. It may here be suggested that, instead of sending out lead in pigs, it might be laminated in our own country for the purpose now mentioned; being a process which certainly could be more cheaply performed here, and might be followed by a considerable saving of freight. Cornish tin used to be exported at one time by the East India Company, but at a heavy loss, in consequence of competition by the cheaper and better product of the Malay countries. British copper also, at one period, was largely shipped; but this, with the exception of that for sheathing, has shared the same fate, having been driven from the market by a superior article from Japan, and a cheaper one from South America. Spelter, zinc, or tutenague (the same metal under three different names), formerly an article of export from China, is now imported; and we perceive that the Americans alone, in 1834, conveyed to the amount of 200 tons. The total value of all the European metals landed in 1834 approached to the sum of £190,000 sterling,—a trifle, in all probability, to what it will become after a free intercourse has been fully established.

Woollens have always been an article much in demand in China, and those used are chiefly broad-

cloths, camlets, and long-ells, which find their way throughout nearly the whole empire. The value imported by the British in 1831 was, in round numbers, £520,000 sterling. The cold winters, even of the most southern provinces, render such fabrics a comfortable wear; and, considering the diminished supply and high price of furs, it is probable that a great demand will be created for them in the course of a few years.

It is only since the opening of the trade in 1814 that our cotton goods were received in China, and yarn was not imported until about the year 1827. The descriptions of calicoes most in request are chintzes, long-cloths, muslins, cambrics, and bandanas, scarlet and blue. The twists in demand range from No. 16 to 36. The total value of British cotton-goods imported into that country by the English and Americans, in 1834, exceeded three hundred thousand pounds sterling (£305,513); a large import, if we consider that it is the growth of no more than twenty years; that it has had to struggle all the while against the influence of the monopoly; and that the greater part of it has been imported, as it were clandestinely, under the American flag.

Of the minor articles it is not necessary to speak at large. Watches have long been taken, and generally by the ton or half-ton. The fancy of the Chinese is to wear them in pairs, in accordance with a pretty general prejudice in the East against an odd number. Flints are also sent largely from England, to be used, we believe, chiefly for lighting matches, and not, as some have supposed, as an ingredient in the manufacture of porcelain. Scarlet-cuttings, or the tailors' refuse of scarlet cloth, is also an article

of some consequence, and it is so regular an object of trade, as always to be quoted in the printed Price-current. In that of the 14th of November 1833, it was noted as varying from 90 to 100 Spanish dollars per pecul,—being equal to three shillings the pound. There is another commodity that used to be received to some extent, but which has of late years wholly disappeared from the market. This is Prussian blue, or the prussiate of potass; and the cause of its discontinuance, as affording a singular example of the ingenuity of the natives, deserves to be mentioned. One of them, who visited England a few years ago, frequented a manufactory in the neighbourhood of London, and having acquired the art of preparing it, commenced, on his return, a similar establishment in the neighbourhood of Canton, where it is now made at so cheap a rate and in such abundance as to exclude foreign competition. The Chinese are the only people of the East possessing the spirit, intelligence, or courage, to have accomplished such an enterprise. The total value of British manufactures imported in 1834, by the English and Americans, was upwards of £1,350,000 sterling; consisting of

Woollens,	£635,217
Cottons,	305,513
Metals,	188,643
Clock-work, glass-ware, &c.	25,150
Total,	£1,354,523

What additional articles are likely to be imported under a free trade it would be presumption to state with any confidence; but we may suggest that salt, colonial spirits, glass-ware, timber, and dyewoods, with cured fish, are not unlikely to succeed. Salt is an imperial monopoly in China, and of course the

price is sufficiently high to encourage the smuggling even of so bulky an article, which in our own country is so cheap that it may be used as ballast. Glass-ware also must be sent chiefly from Britain; but this never can be done until the manufacture is relieved from the vexation of the excise, and we perceive that the Americans are already supplying it from their own manufacture. We are encouraged to suggest colonial spirits, or that manufactured from sugar, from perceiving that the Chinese in the Indian Islands are large consumers of Hollands or Geneva, and knowing that there is no good and can be no cheap spirit prepared in their own country.

The importations by the Americans consist of Spanish dollars, furs, ginseng, or the root of the *Panax quinquefolium*, Turkey opium, Chili copper, occasionally cotton-wool, cotton-fabrics, woollens, quicksilver, wines, spirits, and generally all articles supplied by the English. They bring also sandal-wood from the Sandwich and Feejee Islands, and not unfrequently pepper, tin, and other commodities, technically known by the name of Straits' Produce; that is, the produce of the Straits of Malacca, comprehending generally that of all the western countries of the Malayan Archipelago. They not unfrequently also bring cargoes of rice from Java and Manilla. The trade in furs was created by that people, which, owing to the monopoly of the East India Company, has hitherto been almost exclusively in their hands; and the skins usually imported are those of the rabbit, seal, sea-otter, land-otter, beaver, and fox. They are frequently conveyed direct from the north-west coast of America, and of late years from the recently-discovered land of New South Shetland.

The total value of furs and skins imported in 1831-32 was only 166,766 dollars; that of British woollens carried in their ships amounted to 229,022 dollars; while the cottons, nearly all English, were estimated at 398,799 dollars. The metals imported by the Americans in the same year, consisting of quicksilver, lead, iron, copper, spelter, and tin, were of much higher value, being not less than 975,736 dollars; of which, the quicksilver alone amounted to 720,650. The greater part of this, we presume, is employed in the manufacture of mirrors,—an article of large consumption in China; and we think it would be no longer required, were this country in a capacity to supply them in a finished state. In 1834, their imports of British manufactures, chiefly woollens and long cloths, amounted in value to very nearly two millions of Spanish dollars, or about £425,000 sterling. Of this branch of trade, of course, they are likely to be deprived. In the earlier period of their intercourse, and indeed until very lately, the Americans were in the habit of importing bullion very largely. In 1834, they imported to the value of little more than one million of dollars, and paid for their export-cargoes in bills on London and Respondentia bills, to the value of upwards of four millions six hundred thousand dollars.

Of the Dutch, French, and Portuguese trades, which are comparatively inconsiderable, it is not necessary to say much. The first of these nations import camlets of an excellent quality, with some Geneva, the colonial products of Java and the neighbouring islands, such as Banca tin, swallows-nests, and the spices of the Moluccas. The commerce of the Portuguese is chiefly derived from their Indian

possessions, Goa and Damaun, on the Malabar coast; and the principal commodity is opium, procured at the last-named settlement. They also carry on to a considerable extent a trade from the British possessions of Calcutta and Bombay.

With respect to the importations by native vessels, these consist of the various products of the Eastern Archipelago, of Japan, Tonquin, Cochin-China, Cambodia, and Siam, but which, as they have been generally either described or alluded to already, need not here be enumerated. Mr Crawfurd, in his evidence before the Select Committee of the House of Commons on the affairs of the East India Company, in the year 1830, gave the following statement of the places with which the four provinces of Quang-tung, Fo-kien, Tche-kiang, and Kiang-nan, maintain a commercial intercourse, and of the number of junks yearly trading with each, viz.:

	Junks.
Japan, ten junks, two voyages yearly,	20
Philippine Islands,	13
Soo-loo Islands,	4
Celebes,	2
Borneo,	13
Java,	7
Sumatra,	10
Sincapore,	8
Rhio,	1
East Coast of Malay Peninsula,	6
Siam,	89
Cochin-China,	20
Cambodia,	9
Tonquin,	20
Total junks,	222

The same authority estimates the whole shipping employed in this branch of commerce at 80,000 tons.

With reference to the future trade of Britain with China, it may be proper to describe the character of that class of the native population who are

principally engaged in mercantile transactions; because with these our merchants are likely to form an intimate connexion. This we have the means of doing on the authority of the celebrated Prussian missionary, Mr Gutzlaff, who thus describes them in the Canton Register for June 1833:—"No Chinese tribe," says he, "is so widely spread on the coasts of China and Mantchoo Tartary, as that of the Chin-tcheou men, as we call them. They designate themselves *Ho-kien-lang*,—Fo-kien men,—because they are natives of that province. The principal districts from whence they come are Tchang-tcheou-fou, Tong-san-hien, Suen-tcheou-fou, and Hing-hoa-fou, all situated in the south-eastern part of Fo-kien province, between 24° and 26° of north latitude. As the inhabitants of the east coast of Canton province differ very little, both in language and manners, from those of Ho-kien-lang, we generally comprise them under the name of Chin-tcheou men. Almost all the emigrants to the Indian Archipelago, Cochin-China, and Siam, belong to one or other of these races; the latter are the more numerous, the former the wealthier part of the community. Both Formosa and Hai-nan have been colonized by them; even the barren Piscadores, or Pong-hoo Islands, number thousands of inhabitants belonging to their tribe. We may judge of the prolific extent of this race, when we trace their settlements all along the coast of Tche-kiang up to Ning-po. All the seaports of the empire swarm with Ho-kien-lang, who are the soul of every trade and enterprise. They are a haughty, stubborn race, often cruel and violent, yet there is a great deal of generosity and sense of honour in their breast. As such, they are shunned by

their northern countrymen, whom they despise, and not unfrequently insult. The poorest amongst them thinks himself ennobled by the title of *Ho-kien-lang*, and is offended whenever another name is applied to him. It is needless to dwell upon their skill in navigation: if they were disciplined after the European manner, and had ships like our own, they would very soon sail round the Cape of Good Hope, or go in search of the Dollar Country. We have been a passenger on board a brig, of which a Ho-kien-lang was the commander, who took observations of the sun, and was by no means a bad sailor. If government would grant them permission, they would doubtless improve upon their vessels; yet they are strictly confined to the model of a shoe; and wo unto him who changes the fashion! If, by mischance, the vessels built in Siam and in other ports deviate a little from this form, they have to pay a very high duty as soon as they make their appearance in any Chinese port, and would be prohibited from entering the northern ones. Every Ho-kien-lang is by nature a merchant, and he trades from the time he can lisp till he sinks into the grave. Though they are superior to all their countrymen in navigation, they are extremely deficient in mechanical arts; even in their own districts, a great part of the mechanics are emigrants from other provinces. Neither do they much excel in agriculture. Their native districts are barren and stony; to raise the supplies for a moderate family is a very arduous undertaking, and therefore they leave just as many hands as are indispensably necessary for the cultivation of the ground, betaking themselves to the sea and to other countries in order to supply

their wants. Their partiality for intercourse with strangers gives us hope that they will be the means of promoting our commercial interests with the northern ports. Our possessions in the Indian Archipelago are the frequent topic of their conversation. They admire such a liberal government, which grants them so many privileges in its own dominions that are utterly denied to the English nation in Fo-kien province. The large sums of money annually remitted by the Ho-kien-lang in our settlements to their families and friends at home, speak volumes in favour of our administration and nation." We shall add, that the native provinces of the race in question, are those situated on the fine estuaries and harbours which abound on the continental side of the Straits of Formosa.

We shall now attempt to estimate the total value of the foreign trade of China, or, at least, of that portion of it which is carried on seawise. The earliest statement of the British and American trade with that country, entitled to any degree of confidence, is for the year 1816-17; and the latest is for 1833-34.

Nation.	Imports and Exports in Dollars.	
	1816-17.	1833-34.
British Trade,	27,748,372	43,920,063
American Trade,	11,312,600	19,565,004
Total, dollars,	39,060,972	63,485,067

It appears, from this account, that the British trade, in seventeen years, has increased by very nearly sixty per cent.,—one branch of it, that of the

Company, continuing nearly stationary,—while the portion carried on by the Americans, although they no longer supply the Canadas with tea, and have lost the carrying-trade to France and Holland, has increased nearly seventy-three per cent. To this statement ought to be added the Portuguese, Spanish, Dutch, and French commerce, with an occasional ship from Denmark and Sweden. The trade under the Portuguese flag is very considerable, conducted chiefly through the ports of Damaun, Goa, Bombay, and Calcutta, as already stated; and we imagine the joint exports and imports can hardly be estimated at less than 5,000,000 dollars. The Spaniards employ a good number of small vessels, belonging chiefly to the Philippines. In the Parliamentary papers, their trade is stated, in a round sum, at 500,000 dollars; while that of the Dutch, in the same papers, is given at 742,693 dollars. The French commerce occupies four or five ships yearly, and its value may probably be estimated at 500,000 dollars; making the total proceeds of the intercourse with America and Europe, omitting the occasional visits of the Swedes and Danes, amount to 70,227,760 Spanish dollars, or £14,923,399. The tonnage engaged by the European and American nations in the same traffic might, before the opening of the trade with Great Britain, have been estimated in round numbers at 85,000; but, in the very first year of the emancipated commerce, a number of shipping, nearly equal to this amount, cleared out from Canton for the United Kingdom alone. The native craft,—that is, the junks carrying on foreign trade, is supposed to be about 80,000 tons; but the value of their

cargoes, consisting for the most part of coarse manufactures and raw produce, is small, compared with those of the European and American shipping. From a tolerably intimate acquaintance with it, however, we are not disposed to estimate its value at more than 20,000,000 dollars. This, added to the American and European commerce, will raise the value of the whole foreign trade of the empire to above 90 millions of dollars, or, in round numbers, to nearly 20 millions sterling. This shows the great capacity of that country for foreign trade,—which, we repeat, is yet in its very infancy: it shows also the vast difference between the European, and those even of the best-governed of the Asiatic nations; for the estimate quoted, considerable as it seems, is, after all, not equal to more than one-fifth part of the foreign trade of the United Kingdom, of which the population scarcely amounts to one-fifteenth part of that of China. In order to afford the reader some notion of the importance of the foreign trade to that government, without any reference to the vast number of lucrative offices to which it gives rise, we present him with a statement of the import-duties for five years :—

	Taels.
1828-29,	780,058
1829-30,	899,535
1830-31,	997,071
1831-32,	1,120,145
1832-33,	1,257,828

We see here a rapid increase in the public revenue every year. Of the amount of the export-duties no details have been published; but, should they equal the import-duties, and as there is little smuggling in the export in comparison to what takes place in the import trade, it is probable they are much larger,

then the net revenue derived from the foreign trade would have amounted in 1832-33, at 6s. to the tael, to upwards of seven hundred and fifty thousand pounds. Although this may not appear to us a very large sum, yet it bears a considerable proportion to the entire money-revenue of the Chinese Empire, the gross amount of which does not exceed twelve millions sterling.

We shall next give a brief view of the different ports which enjoy a foreign trade, that of Canton being the principal. This city is built on the north side of the Choo-kiang, called by Europeans the Canton River, or the Tigris, being 80 miles distant from the open sea, at the head of a magnificent estuary, abounding in islands, creeks, and channels.

Macao, within the same estuary, belongs to the Portuguese, but is notwithstanding jointly ruled by them and the native government. It stands on a small rocky peninsula, attached to the island of Heang-shan by a very narrow isthmus; the circuit of the settlement is said to be about eight English miles, its greatest length three, and its greatest breadth nearly one. The harbour is safe and commodious for vessels of small burden.

The two ports just named are the only places to which European merchants can legally repair; but the coast, from the 21st degree of latitude up to the 40th, contains many rivers, fine harbours, and flourishing towns, from which a great commerce may be eventually opened to Europeans, and, whether opened or not, it is highly probable that a large contraband trade will be established with them. Of these ports the first, in proceeding northward, is

Tchao-tcheou, in latitude 23° 23′, on the eastern frontier of the province of Quang-tung, and on the western bank of a navigable river. It carries on an active intercourse with the Eastern Islands, and in point of importance is the second commercial place in the province.

Amoy, situated in Fo-kien, lies in lat. 24° 27′. The town is upon an island, within a spacious bay or rather estuary, into which fall two rivers of considerable size; and from hence a great part of the trade is conducted with the Eastern Islands, Siam, Tonquin, and Cochin-China. It was here that the English once had a factory. Mr Gutzlaff gives the following account of this place:—"After many delays, we finally arrived at Amoy. This place is situated on a very large island, on the left side of a bay, which deeply indents the country, and forms numerous islands. The city is very extensive, and contains at least 200,000 inhabitants. All its streets are narrow, the temples numerous, and a few large houses owned by wealthy merchants. Its excellent harbour has made it from time immemorial one of the greatest emporia of the empire, and one of the most important markets of Asia. Vessels can sail up close to the houses, load and unload with the greatest facility, have shelter from all winds, and, in entering or leaving the port, experience no danger of getting ashore. The whole adjacent country being steril, forced the inhabitants to seek some means of subsistence. Endowed with an enterprising spirit, and unwearied in the pursuit of gain, they visited all parts of the Chinese empire, gradually became bold sailors, and settled as merchants all along the coast."*

* Journal, pp. 173, 174.

Fou-tcheou is the capital of the same province, situated upon the river Min, in the neighbourhood of which are grown the best black teas. The place itself, which was visited by the adventurers of the Amherst in 1832, is estimated to contain 400,000 inhabitants. From the enterprising character of the people, the vicinity of the tea-districts, and from the constant demand for corn and timber, the port would probably prove the most convenient of China for foreign commerce. It is as large as Canton; but as the shallowness of the river does not permit ships to sail up, they usually anchor near its mouth. It is to be observed, that it is in the ports of Fo-kien generally that the contraband trade is most easily carried on by Europeans.

In the province of Tche-kiang, we have at least four stations well fitted for foreign trade; the first is Ting-hai, in latitude 30° 26′; this is the chief place in the group of islands called Tchu-san, and where there are many safe harbours. Ning-po is a large town, situated about twelve miles from the sea, upon the left bank of a river not navigable, but ships anchor in safety at its entrance; and here the English carried on trade down to the middle of the last century. Hang-tcheou, the capital of the province, is in latitude 30° 30′, about twenty miles up a fine river, which European shipping have never entered. The staple articles are raw silk and green teas. Sha-poo lies in latitude 30° 37′; and is the port from which the whole trade of Japan is conducted, and by the officers of the Sylph is described as carrying on a brisk traffic.

In the province of Kiang-nan there is one great commercial town, Shang-hai, situated on the left

bank of the river Woo-sung, from fifteen to twenty miles from the sea, and in latitude 31° 9′ N., and longitude 121° 4′ E. This place, which was lately visited both by the Amherst and Sylph, is described as the greatest emporium of the empire, and as it were the gate to the heart of China. It may be considered as the port of Sou-tcheou,—a city which in luxury and splendour surpasses all others, and in wealth is second only to Canton. It carries on a great trade with Siam, Tonquin, and the Philippines, and Europeans have already begun to do some business there. But, in proportion to its consequence have been the difficulties of access to it, which have been described as greater than those at any other port. The entrance to the river is dangerous; the coast being very low, and many mud-banks presenting themselves in every direction. When properly surveyed, however, it is stated that there will exist no material obstacle; ships of 300 tons may proceed all the way to the city, while those of larger burden may anchor at Woo-sung,—a village a short distance above its mouth. The great rivers, the Yang-tse-kiang and the Hoang-ho, of which the embouchures are within the province of Kiang-nan, have never been examined by European navigators.

In Shan-tung there are two considerable emporia, Kaeou-tcheou and Ten-tcheou; the first, with a spacious harbour, lying in the latitude of 36° 14′; and the last, with a tolerable one, in the latitude of 37° 18′. The former is the chief port of the province, and the latter carries on a considerable trade with Mantchoo Tartary.

In the metropolitan province of Pe-che-lee there

is one great commercial station, named Tien-sing, in latitude 39° 10′, and longitude 117° 6′. This place is situated about forty miles up the Pei-ho, and eighty miles from Pe-king, the capital; but the entrance to the river is represented as difficult, and not accessible to ships exceeding 250 tons burden. Mr Gutzlaff, who visited it in 1831, gives the following description of it: "All the avenues were thronged, and in the shops—generally filled with Chinese manufactures, but some also with European commodities—trade seemed to be brisk. The town, which stretches several miles along the banks of the river, equals Canton in the bustle of its busy population, and surpasses it in the importance of its native trade. The streets are unpaved, and the houses are built of mud; but within they are well furnished, with accommodations in the best Chinese style. A great many of the shopkeepers, and some of the most wealthy people in the place, are from Fo-kien; and the native merchants, though well trained to their business, are outdone by the superior skill of the traders from the south. The trade of Tien-sing is quite extensive; more than 500 junks arrive annually from the southern ports of China, and from Cochin-China and Siam. The river is so thronged with junks, and the mercantile transactions give such life and motion to the scene, as strongly to remind one of Liverpool. As the land in this vicinity yields few productions, and the capital swallows up immense stores, the importations required to supply the wants of the people must be very great."*

* Journal of Three Voyages, pp. 130, 131, 135.

In Mantchoo Tartary itself, or Leao-tong, as it is called by the Chinese, there are two emporia, viz. Kin-tcheou, in latitude 41° 8′, and Kae-tcheou, in latitude 40° 30′. These are places of very considerable traffic, and the recent voyagers state that there is an active demand in them for English woollens and calicoes.

In the island of Formosa, which is annexed to the province of Fo-kien, there are two places of commerce, Tay-wan, the capital, and Ke-lang-tching; the first in latitude 23°, and the second in latitude 25° 16′. The harbour of the former, at which was once the Dutch settlement, is properly a shallow and open roadstead. The port of Ke-lang-tching is the only good one in the island; and here a brisk trade is conducted in the staple productions of rice, sugar, and camphor.

The notices which we have now given are taken from a communication which, we believe, was supplied by Mr Gutzlaff, who accompanied the late adventurers in the Amherst and Sylph, and to whose knowledge, tact, and intrepidity, much of their success is to be ascribed. We have also borrowed from the Companion to the Chinese Calendar, published at Canton in 1833, and from a recent work published there, entitled "The Chinese Commercial Guide;" and we may add, that all the places to which we have alluded will be found, in the map that accompanies the present work, delineated with surprising correctness.

With respect to the opening of a legal trade with these ports,—that is, a trade sanctioned by the imperial laws,—we are of opinion, that under present circumstances there is little prospect of it.

An unrestrained intercourse with Europeans is, to the Chinese, not a commercial question, but a political one; though we believe the ruling class to be as sensible to the advantages to be derived from a foreign trade as the people undoubtedly are. But the government is surprisingly feeble; its army cowardly; and its civil officers corrupt; and all this beyond example in any other country. But for the docile, passive, and unwarlike character of the nation, so weak a power as that of the Tartar conquerors could not maintain its authority for a day; and it is chiefly by bribery and management that it prevents the invasion of the northern hordes, and contrives to suppress internal rebellions. The court is sensible of its own weakness, and also of the strength, courage, and enterprise of Europeans, especially of the British, who, for the last eighty years, have been achieving vast conquests near them, and are now their immediate neighbours. They are acute, and wary enough to be alive to their own position. They know their safety to lie in keeping us at arm's length, and believe, and very truly, that should we be permitted to close with them, they would inevitably be subdued and trampled upon. Nothing, then, short of actual force will induce them to relinquish their present policy; and whenever that force is applied, they will as surely yield, making, it is very probable, consistently with the character of the government and the people, a merit of necessity.

There are two ways in which a general trade with China might be carried on. We may take possession of an island on the coast with a good harbour, either uninhabited or nearly so (and we

believe there are such), and there form a commercial emporium. If such an establishment were created, there is not the least doubt but that it would very soon become the seat of an extensive commerce; particularly if near enough the continent to be visited by open boats, by means of which an active contraband trade might be maintained. Sincapore is a proof of what may be effected by such a station; and Formosa, under the Dutch, in the seventeenth century, afforded a similar illustration. Although the former be from seven to ten days' voyage from Canton, the business with China amounts in value to near two and a half millions of dollars yearly; and this, too, notwithstanding that all dealing in tea has been hitherto virtually prohibited. On what principle, indeed, such an island on the coast as we allude to is to be obtained, we are at a loss to understand, without a very serious breach of the law of nations. It was the object of our two embassies to Pe-king to require such a possession by treaty; but the modesty of the proposition upon our part was, with some propriety, compared to a parallel demand upon the part of his Celestial Majesty for a cession of the Isle of Wight.

The second mode in which an intercourse might be maintained with additional ports is by smuggling, in the same way as the trade in opium is now conducted in the river of Canton itself; and in the same manner as we carried on a brisk traffic with the American Main from the West Indies during the predominance of the Spanish colonial system. The acuteness of our merchants will soon discover convenient stations for such enterprises, and the greater number of these localities are indicated in the sketch

which we have just given. The ships engaged in the traffic, as it appears to us, ought not to enter the rivers or go up to the principal towns. Two or more of them may lie at a convenient distance, and in due time the Chinese traders will repair to them with their silks and teas, receiving in return our opium, woollens, and calicoes; and the mandarins, bribed as usual, and apprehending no personal danger to themselves from the vengeance of the government, will wink at the proceeding. During the voyage of the Amherst, opium was repeatedly asked for with impatience, and teas were offered in return; but little traffic could be carried on, because the voyagers had no opium, and no person on board was a judge of tea.

Meanwhile, the contraband trade is rapidly increasing in the river of Canton, and yearly extending to other articles besides opium. In 1834, out of 139 British and American ships, which traded with China, no less than forty-four of the one and thirteen of the other, in all fifty-seven, proceeded no farther than Lintin; that is to say, evaded all port-charges, and for the most part all duties. The saving effected by carrying on the trade in this manner we possess the means of estimating, in so far as the ship is concerned. A vessel proceeding to Canton in the regular trade pays, in port-duties, exactions, and charges, about 8000 Spanish dollars; one proceeding with rice, 3000 dollars, and one engaged in the contraband trade only 1500 dollars. Thus, between the regular and the contraband trade, there appears to be saved upon each ship a sum equal to 6500 dollars.

We shall next offer a few observations upon the

system at present pursued by Europeans in their trade with the Chinese. The river of Canton forms one of the finest navigable channels on the globe; and hence, although the commerce has been so long conducted, and often in vessels of from 1000 to 1500 tons, no shipwreck has, we believe, yet occurred. It is also to be observed, that ships are here loaded and unloaded with extraordinary despatch,—equal, indeed, to that of any port in the world, if we except Liverpool and New York.

By the strict letter of law, the trade with all foreigners ought to be confined to the Hong, or licensed merchants. These, at present, are eleven in number; four new ones having been added in 1829, and one having failed that year. Every ship that enters the port is required to have one of these as security for the duties as well as for the conduct of the crew, and must receive both a government linguist and a comprador or purveyor, before she can commence unloading. The Hong may in fact be looked upon as a species of custom-house officers. Although the law declares that foreigners shall trade only with them, this is evaded in practice, and a great business is now carried on by what are called the outside-merchants, or, in other words, by the native dealers generally. The foreigner purchases a small part of his cargo from the security-merchant, and then, under a sort of license from him, trades openly with the others.

The opium trade, in its comparative infancy, was conducted at Wham-poa, from whence it was driven, partly by the edicts of the local government, but more by the exactions of the mandarins. It then took refuge at Macao, from whence it was forced by

the rapacity of the Portuguese, and is now managed at the island of Lintin, about eighteen miles farther up. At this place from seven to twelve ships are constantly lying as depôts for opium. The Chinese smuggling or fast boats, as they are called, come alongside at night and receive the drug, either paying cash for it, or exhibiting an order for its delivery from a European merchant of Canton. But, besides these depôt-ships, many other vessels lie at the same station, and never enter the port, conducting their whole commercial intercourse by smuggling. Even the Price-current states the sales of various articles as deliverable in the course of the regular trade and in that by smuggling indiscriminately. Let it be observed that all this contraband traffic is conducted by vessels having lascars for their crews, and in the presence of the imperial fleet,—a sufficient proof, if any were wanting, of the corruption of the native officers, and of the wretched condition of their military force.

Vessels carrying on the regular trade are liable to a variety of port and other charges, of which the following, for a ship of 867 tons burden, may be taken as an example:—

	Taels.	Dollars.
Measurement-charge,	1,701.418	= 2363
Cumshaw or present,	1,600.683	= 2223
Pilotage inward and outward,		120
Bar-boats and other small charges, about		30
Linguist's fee, about 173; comprador's fee, 50,		223
Total dollars,		4959

The export and import duties are always paid by the Chinese merchants; so that they appear mixed up with the price of the article, and the foreigner knows no more of them than that they

exist. In the Chinese Commercial Guide there is a list of the duties on a few articles of export and of import. These are specific taxes upon the quantity; and a few examples of their operation as *ad valorem* duties may here be given, taking the prices of the different articles as they were in 1834. The duty on English iron amounted to about eighteen per cent.; on Indian cotton-wool to about fourteen per cent.; on Bohea tea, to about twenty per cent.; and upon Congou to about ten per cent.

We have now to offer a few remarks upon the weights and moneys of China. The only coin that is now in general use throughout the empire is the Le or Cash, a small circular piece, with a square hole in the middle, and composed of an alloy of copper and zinc; its intrinsic value may be about one-twelfth part of an English penny. The nominal moneys are those called the Fun, Tseen, and Leang, denominated by foreigners the Candareen, Mace, and Tael. These, as well as the le, bear respectively to each other a decimal proportion; that is to say, ten cash make a candareen, and so forth. The weights are exactly the same as the moneys, up to taels; then sixteen taels make one catty, and 100 catties make a pecul. The following table shows the relative value of the moneys of China, and of its weights; and it is to be observed that they have no measures of capacity, all fluids being weighed.

Pecul.	Catties.	Taels.	Mace.	Candareens.	Cash.	Avoird. lbs.	oz.	Grains Troy.
1	100	1600	16,000	160.000	1,600,000	133⅓	0	...
	1	16	160	1600	16,000	1⅓	0	...
		1	10	100	1000	0	1⅓	579·84
			1	10	100			57·984
				1	10			5·7981

There are residing at Canton upwards of a hundred European and Indian merchants; consisting of British, Americans, French, Dutch, Danish, Swedish, Spanish, and Portuguese, with Parsees and Mohammedans, mostly from Bombay and Surat. The principal mercantile firms consist of eight British establishments, seven American, and one joint French and Dutch. The resident merchants, of course, are thoroughly acquainted with the trade, and are all men of business, activity, intelligence, and great integrity. With their assistance, the first year of free traffic has passed over most favourably, and in such a manner as to contradict almost every assertion of the opponents of an open intercourse with the Chinese. Upwards of 80,000 tons of shipping have cleared out for England, for the most part with European crews; yet there has been no example of any quarrel between the sailors and the natives. Instead of a scarcity and inferior quality of tea, as predicted, there have been exported for this country upwards of 43,000,000 of pounds weight, being 12,000,000 of pounds, or nearly forty per cent., more than the average annual exports of the East India Company; and the article has been at least of equal quality, and much fresher than any tea ever furnished under the monopoly-system.

The public affairs of the Americans, French, and Dutch, in China, are managed by consular agents; and although these functionaries be not publicly recognised by the imperial government, they are virtually so by the provincial administration, which transacts all business with them through the Hong-merchants. The British trade, formerly transacted by the Company's Factory, an establishment which

cost upwards of £100,000 per annum, is now carried on by royal commissioners. These are three in number, with a secretary and master-attendant to assist them in details. The commission has power to issue directions and regulations respecting commerce, and for the government of his majesty's subjects in that part of the world. They also constitute a Criminal and Admiralty Court, authorized to judge and determine in all offences, with the assistance of a jury of twelve men: And their power extends to all subjects of the king within the dominions of China, in its havens and harbours, and within 100 miles of its coast.

The tariff of duties on tea in England, established on the opening of the trade, was as follows:—1s. 6d. per lb. on bohea; 2s. 2d. on congou, twankay, hyson-skin, orange-pekoe, and campoi; and 3s. on souchong, flowery-pekoe, hyson, gunpowder, imperial, and other sorts not enumerated. These rates and duties were assessed on the principle adopted by the government of the United States, and found practicable and convenient from the experience of half a century. The merchants and dealers, however, clamoured at them, insisting that there was a difficulty in distinguishing the different kinds of tea, and the government gave way. The same rate of duty is now imposed on teas of all qualities; this is 2s. 1d. per lb., and the operation of the new law will commence in the month of July 1836.

Under the rated duties at present exacted, an augmentation of the tea consumed has already taken place, to the amount, we believe, of about ten millions of pounds, raising the annual consumption of the kingdom from thirty to forty millions.

The public revenue has gained in proportion; and, instead of an average of three millions five hundred thousand pounds per annum, we may henceforth calculate that the tea-duties will not fall short of five millions; and indeed it may be expected that tea will yield the largest revenue of any one article of our consumption. To ensure this result, however, it will be indispensably necessary that the duty upon it should not exceed that on the corresponding articles of coffee and cocoa; reckoning the rate on both, not by quantity but by value, which would imply the necessity of a great reduction as applicable to tea.

We trust that we have been able to furnish, within the short compass of this chapter, the most comprehensive and correct view of the commerce of China which has yet been submitted to the public. The reader will perceive that this branch of trade has only begun to expand; but, considering the numbers and industry of the people, and remembering that the European intercourse with them has heretofore been, with few exceptions, fettered by a monopoly, he will see that our dealings with the Chinese are capable of a greater extension than any other branch of our foreign trade.

NAVIGATION.

CHAPTER III.

View of the Navigation to China by different Routes.

I. The Direct Navigation from the Cape of Good Hope—Currents off the Cape—Course to St Paul's Island—Occurrences—Island of Amsterdam—Wreck of the Lady Munro—Java Head—Straits of Sunda—Anger Roads—The Barkworth's Log to Batavia—Crocatoa Island—Reefs of Rocks—Rajah Bassa Roads—Lampoon Bay—Sumatra Shore—North Island and the Three Sisters—Dangerous Shoals and Rocks—Omega Shoal—Lucepara Island—Straits of Banca—Straits of Gaspar—Tides—The Nanka Islands—Mintow Bank and Roads—Crossing the Equator—Route eastward of Pulo Timoan—Pulo Condore—The Brothers—Owen's Shoal—Pulo Sapata and the Great and Little Catwicks—The Paracels Islands and Macclesfield Shoal—The Grand Ladrone—Western Channel—The Lema Passage—Macao Roads—Lintin. II. Navigation from Bombay to Ceylon and through the Straits of Malacca—Old Woman's Island—Malabar Coast—Elicalpine Bank—Cape Comorin—Point de Galle and Dondre Head (Ceylon)—Acheen Head, or King's Point—The Surat Passage—Acheen—Malacca Passage—Bengal Passage—Entrance to the Straits of Malacca—The Monsoons and Currents—The Cedar Passage—Nicobar Islands—Prince of Wales' Island or Pulo Penang—The Arroa Islands—Dangerous Rocks and Shoals—Cape Rachado—Malacca Roads—The Great and Little Carrimon Islands—Meeting of the Tides from the Bay of Bengal and the China Sea—Dangerous Rocks and Islets—Rapid Tides—Sincapore—Romania Islands and Reefs—The Soundings and Tides in the Straits of Sincapore—North and South Channels—Eastern Route by Rhio Strait and the Carrimata Passage. III. Directions for sailing between Bengal or Madras and the Straits of Malacca.

In the third volume of British India,* Chapter XVI., the Navigation between England and the East In-

* Edinburgh Cabinet Library, No. VIII., p. 421-468.

dies is described at considerable length. In the following pages, therefore, we shall only lay before our readers a view of the Navigation to China by different routes, from the neighbourhood of the Cape of Good Hope; the voyage from Britain to that settlement being the same, whether the vessel is bound to China or to India. From this point the subject naturally divides itself into three parts. I. The Direct Navigation from the Cape to China. II. The Navigation thither from Bombay. III. The Navigation from Bengal and Madras.

I. We shall consider the DIRECT PASSAGE, which leads through the Straits of Sunda, and thence, at the option of the navigator, through those of Banca or Gaspar, and up the China Sea to the Grand Ladrone. Ships approaching the Cape, and having no occasion to touch there, should endeavour to pass its meridian in about 37° of south latitude, in order to avoid the strong westerly currents that prevail in June, July, and August, on the bank; taking especial care to look out for icebergs, which have been frequently seen of late years, some as far north as the 36th parallel. A look-out should also be kept for the Telemaque Shoal, the existence of which is, however, very doubtful; as is that of many other dangers reported to exist in the track between the Cape and the meridian of St Paul's and Amsterdam Islands.

It is difficult to say what is the best parallel in which to run down the easting. The writer, during a long experience, has been accustomed to that of from 38° to 40° south; but of late years it has been the practice to prefer the 37th parallel, from the meridian of the Cape to that of St Paul's, in which track, it is affirmed, the winds and weather are

more settled than in a higher latitude. In this passage, ships cannot be too careful to guard against sudden changes of wind, which are most frequently announced by lightning in the quarter from which the wind may be expected; and these changes are accompanied with considerable violence, making it advisable to have the mainsail and fore-and-aft-sails, particularly the spanker, out of the way before they commence. They more commonly blow from north-west to south-west, and back from south-west to north-west. Through inattention to this caution, many ships have been brought by the lee, and not unfrequently by means of the spanker has the mizzenmast been brought by the board, to say nothing of still greater dangers. In this track it is no uncommon thing to see immense whales, which are often mistaken for shoals. The author, while in charge of three extra ships belonging to the East India Company, on the 21st of August 1816, in 37° south latitude, and 34° east longitude, perceived, what he at first supposed to be a rock level with the water's edge, and immediately ahead of the Sovereign, which, with the squadron, was going at the rate of six knots, having the wind at north-west by west. He immediately ordered the proper signal to be made to apprize her of the danger. In the mean time, with the help of his telescope, he could clearly discern very large barnacles upon the top of the supposed rock, when, at the instant that the signal was going up, the vessel was observed to change her course, while a great spout issued from the monster, which by this time was so near under the bows, that the spray from it must have reached those on the forecastle.

To ensure the direct passage to China, a ship should be on the meridian of St Paul's and Amsterdam not later than the 1st of July, so as to arrive in August. Should she make the former of these islands, which is the southernmost, and the weather be favourable, she may take the opportunity of sending the boats to the eastern side of the island off the mouth of the basin, which is known by a rock called from its appearance the Sugar-loaf, and which stands on the northern side of the entrance, or starboard hand, in going in. This rock is from eighty to ninety feet high. From a quarter to half a mile off the basin, and probably at other distances, abundance of fine fish, a kind of rock-cod, may be caught with the hook and line. The writer was an eyewitness to this fact in the year 1804, when the boats belonging to the Taunton Castle, East Indiaman, caught as many fish as served the ship's company several days, until, by their frequent use, many of those who partook of them became spotted, and they were in consequence discontinued; but no further inconvenience was felt by the crew. Mr Horsburgh advises, that the instant the fish are caught they should be gutted and salted; for if exposed to rain before that process they will putrefy. The following circumstance, which may be interesting to the reader, occurred on the same voyage:— The vessel just mentioned was one of a large fleet of Indiamen bound to China, under convoy of H. M. S. Athenienne. They went by way of Bass' Straits, as ordered by the Court of Directors, with a view to avoid six French frigates, that were believed to be lying in wait for them in the neighbourhood of the Straits of Sunda. This fleet left Rio Janeiro on the

1st September 1804; and a few days afterwards, in a gale of wind, the Taunton Castle parted company, and saw no more of the other ships until her arrival off Haerlem Bay, in China, where the fleet had anchored only the day before, although she was by far the worst sailer of the convoy. Here an occurrence took place, which we may be excused for making a digression to relate. Our rendezvous-instructions, in the event of parting company, were, to proceed first to St. Paul's, then off Cape Otway in New Holland, next to Norfolk Island, and lastly off Haerlem Bay, a fine harbour on the coast of China during northerly and north-easterly winds. There we were to endeavour to ascertain if any danger was to be apprehended from the enemy in the Bocca Tigris, previous to our entering it. Accordingly, having arrived off the mouth of the bay, upon opening the eastern point, we discovered the Athenienne and fleet at anchor under the land. It now became calm, and our commander, Captain Pierce, being anxious to pay his respects to the commodore (Captain Fayerman), left the ship in the cutter. We had by this time got a Chinese pilot on board to carry us in. This man shortly after evinced considerable uneasiness; and being asked the cause, pointed to a large fleet of Chinese Ladrone junks, that were making their appearance from the western side of the bay, and standing out directly towards us with a breeze off the land. As they approached, he became more and more alarmed, supposing they were about to cut us off, and would fain have quitted the ship, had he been permitted, with his companions in the pilot-boat, who, with several others, upon the nearer approach of the Ladrones, made for the shore with

great precipitation. In the mean time the ship was becalmed, and had driven with the current so far to the eastward as to exclude us from the view of our fleet, who, we afterwards learned, had manned their boats, suspecting that the junks meant to attack us. As these formidable pirates continued to stand directly for us, grape-shot was put into the guns, in addition to the usual charge, and every thing prepared to repel boarding. This precaution, though prudent, proved unnecessary; for the Chinese, deterred perhaps by the appearance of our fleet, all passed without the slightest hostile indication, or offering us the smallest insult. This did not satisfy our captive pilot, who, peeping carefully out of the quarter-deck ports as they were passing, all at once perceived the commodore of the Ladrones under our quarter, when he tried every method to induce the chief officer to fire into his vessel, and seemed greatly surprised and equally disappointed that we had not done so. This fleet consisted of at least 100 sail of large and small vessels, mostly carrying from sixty to eighty men, and having from four to eight guns each. These they carry amidship, being mounted on fixed blocks, and lashed together, so as to be apparently incapable of being pointed in any other direction than *right-a-beam* and point blank, consequently requiring the assistance of the helm to render them effective for objects out of that direction.

But to return to St Paul's. In clear weather this island, as well as that of Amsterdam, may be seen at the distance of eighteen or twenty leagues; though, as in the winter months they are much obscured by clouds, it becomes highly necessary to keep a

good look-out for them, more particularly in the absence of astronomical observations, to ascertain the situation of the ship. The length of the former, in a north-west and south-east direction, is about nine miles, and its breadth five miles, having a level appearance, and sloping down at each extremity when bearing to the north-east. Having scrupulously obeyed our instructions to make our first rendezvous off this island, and finding none of our consorts there, we despatched the cutter and jolly-boats to reconnoitre the shore. In the execution of this duty, and to our great surprise, as we approached the basin, a boat was perceived pulling off to meet us, which, as we presently learned, belonged to the Lively, an English vessel that had come there to catch seals, and had unfortunately been wrecked in a gale of wind from the eastward a few weeks before. We accompanied the strangers thither, and learned that their object in coming out was to afford us relief, under the impression that our boats were those of Sir Edward Pellew, who, with a large convoy for India, was off the island the night before, and who having left the shore at a late hour in the evening, had, they conjectured, missed his ship, and was returning for assistance. This idea was strengthened by the circumstance of their not having seen the Taunton Castle, which was hove-to to the westward of the island.

They also informed us that another fleet had passed the island the previous day, and that several straggling ships had reconnoitred it, which were in all probability others of our consorts that had parted company in the gale soon after leaving Rio Janeiro, and were following up their rendezvous-instructions.

In the mean time we entered the basin, the bar of which consists of large loose stones, that appear as if they could be easily removed, so as to admit of a sufficient channel for ships,—an improvement which would render this a most convenient harbour for repairing the damage that vessels so frequently sustain in this boisterous latitude. The bar, in its present state, will scarcely admit the passage of a boat without striking.

We now proceeded to the habitation of Mr Hingston, master of the Lively, who had taken possession of a comfortable cottage, erected by some Americans who had preceded him in the fishery of seals, in which, as well as in preparing salt for curing them, he was still engaged. In several spots surrounding the basin, his predecessors had planted potatoes, cabbages, and various other kinds of vegetables, and with these he abundantly supplied us, in exchange for some articles of which himself and companions stood in need; though their wants had been greatly lessened by the liberality of Sir Edward Pellew.

But nothing interested us so much during our visit as the phenomena of the hot springs that abound in this island, two of which we saw near the residence of these people, and so close to the basin that a fish might easily be caught in the one and thrown into the other.

This was the only water on the island, and though its taste and smell were somewhat offensive, it was found to be a very wholesome beverage; it would, however, be difficult to obtain a sufficient supply for a ship beyond its daily consumption. Having inspected the basin, which is sufficiently

large to contain the whole navy of Great Britain, and seen all that our limited time would permit, we were invited by Mr Hingston to take some refreshment. Preparatory to this, he desired his chief mate to procure a fish,—a direction which he very promptly complied with, by throwing his hook into the basin and dragging one out immediately, to our great satisfaction. He then showed us the facility with which he procured cray-fish, by merely putting a bait over the side of our boat, then lying with her bow on the shore of the basin, when numbers of them were caught by the hand, in a manner which at once amused and surprised us. While thus engaged, the jolly-boat was despatched to bring back the articles that Mr H. required from the ship, which was now lying to leeward of the basin, the wind being westerly. After waiting a reasonable time for her, and conceiving that Captain Pierce objected to her return at so late an hour, we took leave of our host, thanking him for his kindness and assistance. The wind was now increasing to a fresh gale, and upon our getting half the distance between the shore and the ship, we perceived the jolly-boat returning to the basin at a considerable distance from us. It being now sunset, we endeavoured to hail her, and made signals to return, but without effect. In the meantime, we got on board, when it became necessary to double-reef the topsails, and put the ship under such canvass as would, by means of short tacks, keep her to windward, and as nearly to leeward of the basin as was possible. In this state of anxiety, with lights at the mast-heads, we spent the whole night. As soon as day dawned we had hands at the mast-head eagerly looking out for the jolly-boat;

when, after three hours' intense watching, we happily discovered her little sail occasionally making its appearance between the waves, which had now increased to such an extent as to cause some apprehension for her safety. Our joy upon this occasion was soon interrupted by the disappearance of the sail, which we hoped was only necessarily lowered on account of the weather. This dreadful suspense lasted two hours; the word was then passed for volunteers to go in the cutter to the assistance of the jolly-boat, lest any accident should have happened to her; and she was immediately lowered and manned with a brave crew, who were told, that, in the event of the ship seeing the jolly-boat, a signal of recall would be made to them. She had not proceeded a cable's length to windward before we again had the great satisfaction to see the little sail rolling down to us before the wind. The cutter was now recalled, and in about half an hour afterwards we had the inexpressible delight of receiving our companions safely on board.

It may be useful to observe, that in favourable weather a ship may anchor off the basin a mile from the shore, on a sandy bottom resembling gunpowder, in twenty fathoms water, with the Sugar-loaf bearing west-north-west *by compass*. This situation would, in the event of the wind coming in suddenly from the eastward, enable her to clear the land, particularly on the larboard tack, when she might take shelter under the lee of the island; and as the easterly wind is seldom of long continuance, she could soon regain the anchorage if necessary. The Hindostan, East Indiaman, anchored here in 1793, about a mile and a quarter east from the entrance

of the basin, on her passage to China with Lord Macartney's embassy. On examination, they found the basin to be the crater of a volcano; its circumference at the water's edge being 2980 yards, or nearly a mile and three quarters.

By taking the perpendicular height of the surrounding sides at 700 feet, and the angle of their inclination at 65°, the circumference of the crater will be 2 miles and 160 yards; the depth of water, 29 fathoms, or 174 feet, added to the average height of 700 feet, will make the whole depth of the crater 874 feet, its form being that of a tolerably regular ellipsis.

The entrance of the basin is about twenty-five yards wide, formed by two narrow causeways or ridges of rock, that run out from two peaks, which terminate the sides of the crater, one on each side; that on the right or northern side, is 743 feet high; and at its foot, on the causeway, there is a hot spring where the thermometer stood at 212°, in which were boiled some fish; and this is the general standard of heat at all the springs round the water's edge. From the ship at anchor, fires were seen to issue from various crevices on the island during the night, it being fraught with volcanic matter. From the north and west points of it breakers project about one-fourth of a mile into the sea. The tide rises about three feet; high water, at full and change of the moon, takes place about eleven o'clock.

Sealers who have resided on this island describe the weather to be fine in summer, but stormy in winter, whirlwinds sometimes tearing the water from the surface of the basin. Torrents of rain, which burst over the hills, pour down and form

deep ravines in them. The variation of the compass here in 1747 was 17° 35′ west; in 1764, it was 18° 45′; in 1789, 19° 45′; and in 1793, in the crater, it was 19° 50′ west.

As the result of many observations, it may be stated, that the anchorage is in lat. 38° 42′ south, and the south end of the island in 38° 47′; its longitude, as determined by lunar observations and chronometers, being 77° 52′ east. It should be observed, that there is not a shrub on the island of St Paul's, coarse grass and a kind of rushes or reeds being the only verdure. The crew of the Lively had frequently seen what they supposed to be an immense wild hog, which, after repeated endeavours, they at length shot; when, to their mortification, it proved to be an enormous sow, which was found, on being opened, to be pregnant, and had probably been left by the Americans who preceded Hingston. The writer saw the head of this animal, which alone weighed 39 lbs. and a fraction.

The Island of Amsterdam is situated on the same meridian as St Paul's, from which it is distant seventeen leagues, its latitude being 37° 52′ south, and longitude 77° 52′ east; and in fine weather may be seen from the anchorage of the latter. It is about twelve miles in circuit, and may be discerned from eighteen to twenty leagues. Vlaming, the Dutch navigator, anchored in sixteen fathoms, black sand, about a cannon-shot from the shore, at the southern extremity; he landed, but found no water, and the bushes on this side made it difficult to penetrate into the interior.

In 1770 the Morse, East Indiaman, sent her boat on shore, when part of the crew landed with diffi-

culty, and found the surface covered with high grass and rushes, but could procure very little water. A French ship, in March 1792, observed it to be all in a blaze, the smoke indicating vegetables on fire, kindled probably by some local residents, or perhaps by lightning.

The necessity to keep a good look-out for these islands has been strongly manifested by the recent loss of the ship Lady Munro, Captain J. Aiken, which, after completing her cargo at the Isle of France, being bound to Van Diemen's Land, on the night of the 11th October 1833, ran stem-on upon Amsterdam, and in a few minutes was a total wreck. Out of a crew of ninety-nine persons, including passengers, seventy-eight met a watery grave, amongst whom were six ladies and ten children. The twenty-one who escaped remained fourteen days on the island, during which they subsisted on birds' eggs and a little soaked rice; when, perceiving a ship in the offing, they set fire to the jungle, which had the desired effect of attracting the attention of her crew, who sent their boats on shore, and conveyed them back to the Isle of France, whither she was bound.

Having reached the meridian of these islands, which may be passed to the northward or southward, or between the two, as is most convenient, such a course should be steered as to cross the meridian of 80° east, in latitude 38° south, the meridian of 90° east, in latitude 33° south, the meridian of 100° in 24° south, so that on the parallel of 20° south, the ship may be nearly on the meridian of Java Head. She may then shape her course so as to pass westward

of Christmas Island,* which, if there be any doubt of her longitude, it will be advisable to make previously to entering the Straits of Sunda. She may now shape her course for Java Head, taking care, by frequent observations of the chronometer, that she be not carried to the westward by the current which often prevails about June, July, and August.

JAVA HEAD, in latitude 6° 48′ south, and longitude 105° 11′ east, is a bluff promontory, at the foot of the high land that forms the west end of Java, between which and Prince's Island is the Behouden, or Safe Passage of the Dutch, leading to Sunda Strait. This passage is about four miles broad in the narrowest part, that is, between the Friar, a remarkable rock lying off the First Point of Java, and the Carpenters' Rocks, which extend about a mile from the south point of Prince's Island, and over which, as well as the Friar, the sea breaks high during westerly winds or in bad weather. There is no anchorage near the Carpenters, and they ought therefore to be carefully avoided. The Friar Rock bears from them south-east by south five miles.

The situation of these rocks, exposed to the open ocean, causing the surf to break at all times more or less, and the apparent narrowness of the passage, is not unfrequently the cause of preference being given to the great channel between Crocatoa and Prince's Island; but there are few if any instances on record of shipwreck in Prince's Strait. The mariner, how-

* The centre of this island is in latitude 10° 31′ south, and longitude 105° 34′ east; it is of a square form, about three leagues broad, and may be seen at the distance of twelve leagues. There is no anchorage near it, and the only accessible part is on the north-west of the island, on a white beach of stones and coral.

ever, must be guided by circumstances; and should he determine on the latter, he may pass the Friar from one cable's length to any distance he pleases. Few experienced navigators would approach, by choice, so near to land, however bold it may be, as not to guard against the probability of accident from sudden changes of wind, sets of the tide, or calms, which so frequently happen in the vicinity of straits or high land.

PRINCE'S ISLAND, or Pulo Pontang of the Malays, is the largest island at the entrance of Sunda Strait. Its north end is in latitude 6° 27′ south; the peaked hill at the south-east side, which is the highest part of the island, is in latitude 6° 35′ south, longitude 105° 15′ east, and four miles east of Java Head. It has an extensive bay, but little known to Europeans, open to the south-east, with soundings of various depths. The north side of the island has from twenty to twelve or ten fathoms near the shore; but the anchorage is without shelter, and too near the land for ships to lie in safety. The common anchorage is on the east side, having its northern extremity north half east about three miles, and the hill south-west by west in thirty-eight fathoms, fine sand, about three quarters of a mile off shore; but as this road is inconvenient for watering, the peaked hill may be brought to bear north-west by north, where the ship should anchor in thirty-five fathoms, soft ground, about half a mile from the shore. Here is a small sandy bay, and at its eastern part a run of fresh water, where the casks must be filled about 100 yards up (the higher the better), otherwise the water will be brackish. It is only during the west-

erly monsoon that water can be conveniently procured here; for the springs are nearly dry in the south-east monsoon, for want of rain. The strong winds also, that blow at this season over the west part of Java, would render this a lee-shore.

The First Point of Java, in latitude 6° 44′ south, and two leagues to the northward of the Head, is the southern extremity of the entrance of Prince's Strait, close off which the Friar Rock is situated. Having entered this passage, and being bound through the Sunda Strait, it will be advisable to shape a course so as to pass within two miles of the Second Point, from which distance to one mile and a half there is from sixteen to fifteen fathoms water, where, and indeed between Mew Island and this point, there is no hidden danger, except near the shore. Here, and in the whole passage to the Fourth Point of Java, and even through the Straits to St Nicholas Point, ships in the south-east monsoon may anchor, in the event of calm, which at this season gives this passage a great advantage over that between Prince's Island and Crocatoa, where no anchorage can be had.

The Barkworth, the Sovereign, and the Providence, on September 24, 1809, passed the Friar within half a mile, at seven A.M., and the Second Point at a quarter past nine A. M. At noon, the Third Point bore east by south five miles, and at half-past six P. M. they anchored in Anger Roads, in seven fathoms, the Cap bearing north by east quarter east; Button, north half east; the Obelisk, south quarter west; off shore half a mile. The best anchorage is from nine to fourteen fathoms, abreast of the village, with the Cap north by east half east, the flag-staff south

by east, off shore about three quarters of a mile. The distance run from abreast the Friar to the anchorage in Anger Bay was, by the log, sixty-six miles, there being a fresh south-east wind the whole way. At seven P. M. the same evening it became calm, and continued so during the night, with a strong southerly current, which, from the account of the master-attendant (Mr M'Gregor), is always the case in this month (September), for three or four days after the change of the moon; after which, it sets to the northward.

MEW ISLAND, in latitude 6° 43′ south, is about a league eastward of the First Point of Java. It is small and hilly, abounding in wood, having a safe but narrow channel between it and Java, over a sandy bottom, with various soundings, from five to eight and ten fathoms nearest the island, where ships may lie land-locked, and be sheltered from all winds. There is a rocky shoal south from the body of Mew Island, but nearest to the Java shore, which is avoided by keeping close to the island; and in every other part a little nearer to it than mid-channel is the best track for vessels passing through or taking shelter here. The shore is rocky on the outside of Mew, but safe to approach, the depth decreasing gradually from nine fathoms.

WATERING-PLACE. On the Java shore, eastward of the island just described, is an excellent watering-place during the southerly monsoon. The water flows from a cascade, which is sometimes hidden by the foliage of the surrounding trees, but it will be easily discovered by its sound. From the beach, by means of a hose, it may be filled into the casks without taking them out of the boats.

THE GREAT CHANNEL. The great channel into the Straits of Sunda lies between Prince's Island and Crocatoa. To enter it any time between March and September, it will be advisable to make Java Head in the way already described, and, giving the south-west end of Prince's Island a good birth, haul up gradually through mid-channel; for, there being no good anchoring-ground near these islands, it will be safest, in the event of calm, to keep well off from both of them. Having brought the Peak of Crocatoa north, distant about three leagues, steer north-east by east half east until that peak bears west by south, then, if bound into Anger Roads, steer east by north; having regard to the set of the tide, and not approaching the Java shore from the Fourth Point into the roads nearer than one mile, as the coast here is rocky in places nearly a mile from the land. There is also a small shoal about a mile and a half from the land, and bearing from the Fourth Point south-west three quarters south four miles, near to which there is fourteen fathoms. This is called Catharine's Shoal, and should be carefully avoided.

Having arrived at or off Anger, the navigator may proceed through the Straits of Sunda, leaving Thwart-the-way Island on the larboard hand at any convenient distance, it being itself steep-to all round. From the south point of this island, the Cap, a small islet, bears east-south-east half south four miles, and from the highest part of Thwart-the-way, the Button, another small islet, bears north-east half east five and a half miles. These islets are both covered with wood, and are steep-to all round. The Browers Sand, between which and the Java

shore there is a narrow passage, having eight fathoms water, is the only hidden danger in this part of the Straits, and may be avoided by not bringing the western side of Pulo Merak to the northward of north-east by north, or by not bringing the Cap to the westward of south-west by south. This sand is about two miles long, in a north by east and south by west line, and nearly half a mile broad; its centre being seven miles east by south from the highest part of Thwart-the-way, and having in some places not more than one fathom and a half water. The author once very narrowly escaped being driven on this sand by means of a heavy Sumatra squall, which came on as he was passing it, and obliged him to clew up with great precipitation, and to let go two bower-anchors. When the ship brought up, we were within half her length of the sand. In the H. C. S. Barkworth, September 28, 1816, we weighed at half-past six A. M. from Anger Roads, with a light air from the southward. At eight A. M., the wind increasing, we made all sail. At nine A. M. the Cap east three quarters of a mile. We steered then directly for the Button, until we were within half a mile of it, and then edged away gradually for St Nicholas Point, being bound to Batavia. At noon the north end of Thwart-the-way was west by south, the Button north three quarters west one mile and a quarter, the Cap south 5° west, the obelisk at Anger (a conspicuous object) south 6° half west, and St Nicholas Point, east 25° north. Latitude, by good observation, 5° 54′ 16″ south, which makes the Button in 5° 53′ 1″ south, agreeing exactly with the position assigned by Captain Horsburgh. As the

passage hence to Batavia is much frequented, a copy of the Barkworth's log to that anchorage may not be unacceptable :—

H.	Courses.	K.	F.	Winds, &c.	Remarks, Sun., Sept. 29, 1816.
1	N.E. by E....	5	–	W. by N.....	At twenty-five minutes past noon, the Button bearing west, distant one mile.
2	E.N.E. to E.	5	–	Hazy weather.	
3	E.	5	–		
4	E. by S.	5	4		
5		5	4		
6	E. ½ S.....	3	–	.....	Pulo Babee, from north to north-east by north five miles.
7	E. by S.....	4	–	Ground 17 faths.	
8	.....	4	–	.....	The east end of Pulo Babee north in twelve fathoms.
9	East.....	2	–	.....	Finding the wind dying away, and a westerly current running, anchored in seventeen fathoms. Pulo Babee, from north half east to north-north-west half west, distant five or six miles.
10		–	–		
11		–	–		
12		–	–		
1	.....	–	–	Current slacking.	
2	.....	–	–	.....	Weighed with the land-wind at south.
3	E. by S.....	1	4	South.	
4	.....	3	4	Gd. 16 to 13 fms.	At daylight, Pulo Babee from west 24° north to west 27° north; Man-eaters' Isle south 50° east; the west end of Tidong north 30° east.
5	.....	3	4	S. by E.	
6		3	–		
7	.....	2	4	.....	At half-past seven A. M., the west end of Tidong north about five miles, in seventeen fathoms.
8		2	4		
9	.....	1	4	.....	At nine A.M., calm and the tide setting to the westward, anchored in nineteen fathoms. The west end of Tidong north 10° west; Man-eaters' Isle south 20° east; the Great Cambuys east by south three-quarters south; and Pulo Babee west by north quarter north.
10	.....	–	–	Calm.	
11	.....	–	–	Sultry weather.	At eleven A. M., the sea-breeze setting in, weighed and made sail.
12	E. by S. ½ S.	2	4	N.E. by N..... Ground 16 faths.	At noon Man-eaters' Isle south 7° east; Great Cambuys east 2°4 south; west extremity of Tidong north 18° west. Latitude by good observation, 5° 53' south. Thermometer, 80° Fahrenheit.

H.	Courses.	K.	F.	Winds, &c.	Remarks, Sept. 30, 1816.
1	S.E.	4	–	Northerly, with sultry weather.	Passing Man-eaters' Isle at the distance of a mile and a half, least water half six fathoms.
2	E.S.E.	4	–		At a quarter past two P. M. the west end of the Great Cambuys north, and the north end of Man-eaters' Isle west half north in ten fathoms, distance from either about three and a half miles.
3	E. by S.	2	2		
	N.W. by N.	2	2		
4	N.W. by W.	2	2		At half-past four P. M., after making two tacks, passed the narrows of Ontang Java Passage, and when the east end of Amsterdam Island bore north, kept away south by east, keeping the east end of Amsterdam north half west, which took us down along the edge of the mud-flat; least water four fathoms.
	E.N.E.	2	2		
5	East	5	–		At half-past five P. M., being nearly abreast of Onrust, namely, east by south half south, distance three-quarters of a mile, made signal to anchor, and anchored in five fathoms, mud; Kuyper's Island south-east half east; east point of Amsterdam north by west; Schiedam north by east; Ontang Java Point west-north-west; veered to twenty fathoms. In company, the H.C.S. Sovereign and Providence.
6	S. ½ E.	4	–		
7		–	–		
8		–	–		
9		–	–		
10		–	–		
11		–	–		At a quarter before eleven A. M. weighed with the sea-breeze, and passed the south-west point of Kuyper's Island, kept it north-west by west, and latterly west-north-west, until we were within half a mile of the Ryniand Beacon, when we bore up south half west for the flag-staff.
12		–	–		
1		–	–		
2		–	–		
3		–	–		
4		–	–		
5		–	–		
6		–	–		
7		–	–		
8		–	–		
9		–	–		
10		–	–	Sea-breeze	At a quarter past one P. M. anchored in Batavia Roads in six fathoms; the flag-staff bearing south half west; the Ryniand Beacon north half east; Kuyper's Island west 30° north; off shore two and a half miles. In company with the Providence and Sovereign. Found riding here H.M.S. Volage, and several sail of merchant-ships. The Barkworth with her consorts remained at Batavia until the 14th of October, and had regular land and sea breezes the whole time. From this anchorage they sailed for Indremayo; arrived there the 20th, staid ten days, and arrived at Samarang the 4th of November; departed thence the 11th of November, went through the Straits of Macassar, and arrived in China (Wham-poa) the 7th of January 1817. It may be useful to observe, that during our coasting along the north side of Java we had almost continued westerly currents.
11	S.E. by E.	2	–	northerly.	
	E.S.E.	2	–		
12	E. by S.	4	–		
1	S. ½ W.	2	–		
2		1	4		

Crocatoa Island, in the entrance of the Straits of Sunda, is between the parallels of 6° 5′ and 6° 12′ south, and the peak, which is remarkably high and conical, is, by the mean of several observations made by the writer, in 6° 10′ south, and longitude 105° 26′ east. It extends six or seven miles from north-west to south-east. On the south-east, the island terminates in a rocky point extending half a mile into the sea, having a depth of thirty-two fathoms close to it. From this point the east end of Long Island bears north a quarter east, and forms a bay which affords excellent shelter from westerly gales. The best anchorage is with the Peak south-west by west, the north-east point of Long Island north-west half west, in from twenty to twenty-three fathoms, mud. There is a coral reef projecting three-quarters of a mile from the east side of the island, and a rock having but two feet water upon it lies about one mile from the south end of Long Island, and about the same distance from Crocatoa. Between the north end of Long Island and the north end of Crocatoa, is a small island and an extensive reef of rocks nearly even with the water's edge. There is a passage between Long Island and Crocatoa, with regular soundings in it, but too narrow and precarious to be adopted, unless in cases of extreme emergency. The ships that have hitherto visited the latter found no convenient place to water. On the north-east end of Long Island a swamp was found, formed by the rain, but no spring was discovered. A very small spring was found on Crocatoa opposite the south end of Long Island, but it could only be approached by boats at high water. A hot spring has also been noticed on the north-

east side of Crocatoa, directly abreast of Long Island, in which the mercury in the thermometer rose to 154°. No inhabitants were seen (in 1815) on these islands, nor any appearance of dwellings. A wild hog was shot on Long Island, and some deer were observed.

PULO BESSIE, or TAMARIND ISLAND, having a high conical peak on its south end, and well covered with wood, is north by east from the Peak of Crocatoa, having soundings between these islands from eighteen to twenty-four fathoms in the fair-way. The only known danger is the HINDOSTAN ROCK, having fifteen feet water upon it; it is only about eight feet in diameter, with ten fathoms water close to it. The bearings from the rock are as follow:—Peak of Crocatoa, south 15° west; east extreme of Long Island, south 2° west; Pulo Bessie, from north 44° east to north 2° west, distance one mile; the Zeeklip Rock, west 5° north, well open to the southward of Keyser's Island.

ZEEKLIP consists of two or three pyramidal rocks, about five miles westward of the south end of Pulo Bessie; the largest of these, having a cleft in it, is sometimes called the Gap Rock; it is steep-to all round.

PULO SEEBOOKO, in latitude 5° 53′ 30″ south, lies north-north-east of Pulo Bessie, having a safe channel of nearly a league wide between them, and is situated about midway between the latter and the south-east point of Rajah Bassa Road; it is high and covered with wood, with some rocks and islets contiguous to its north and east sides, and good anchorage off the north-east part of the island, in ten or twelve fathoms near the small islets. A reef

projects a little way from the south end of the island, and also from the south-west part; but on the north side there are thirty fathoms water between it and the Brothers, which passage appears to be safe, although seldom frequented.

THWART-THE-WAY, or Pulo Renyang of the Malays, is nearly in the middle of the narrowest part of Sunda Strait, being rather nearer to Hog Point than to the Java shore; it is about four miles long, and moderately elevated; its north-east end is in latitude 5° 55′ 30″ south, and longitude 105° 51′ east; it is rocky on its south side, and the bottom in the vicinity is generally so, with deep water on the north side, making it inconvenient to anchor near it. There being from forty to sixty fathoms about a league to the northward, but less water on its south and west sides, the channel between Thwart-the-way and Sumatra is preferred in the westerly monsoon by the homeward-bound China ships, and may be safely adopted with a steady wind; for then, with a westerly current, a ship will speedily get through the strait; but in light, baffling winds, she is liable to be drifted about by strong currents near the Stroom Rock, where there is no anchorage, except in deep water from forty to sixty fathoms.

The STROOM ROCK is from one and a half to two miles north-west of Thwart-the-way. It consists of three or four rocks visible above the sea at high water, and should be approached very carefully, having regard to the set of the current, winds, and other circumstances.

HOG POINT, or Tanjong Toca of the Malays, is in latitude 5° 54′ south, longitude 105° 43′ 30″ east,

and forms the south-east point of Sumatra, bounding the Strait of Sunda on the north. There is a rock six or seven feet above water two miles north-west from Hog Point, called Collier's Rock, which is fifty feet in circuit; and fifty feet distant from it lies a coral rock under water. There is another rock above water, bearing south-south-west from Hog Point; these rocks are all about a mile from the shore, with deep water close to them. It will therefore be advisable to keep beyond that distance in rounding this point.

The ZUTPHEN ISLANDS front the coast of Sumatra to the north-eastward of Hog Point. There are several shoals and islets between them and the main, among which there is said to be anchorage in some places. The largest of these islands and part of the adjacent coast present high ground, mostly covered with wood. The soundings are from forty to fifty fathoms on their south side, where they *ought not to be closely approached;* but towards the northernmost there are from twenty-three to thirty fathoms, where ships might occasionally anchor, particularly off the north end of this island, which lies in latitude 5° 50′ south. From this anchorage the western extreme of Thwart-the-way bears south by east a quarter east; North Island, north by east a quarter east; and Bantam Point, east by south half south, in twenty fathoms. From the South Zutphen there is a reef of rocks about two cables' length, with ten and twelve fathoms in the narrow gut between it and the island. The Bombay, East Indiaman, after dropping two anchors, was driven upon this reef, where she lay some time, and after throwing her guns and part of her cargo overboard, was hove off

by the exertions of the fleet into the gut between it and the shore; but she was found to have sustained so much damage that it was necessary to proceed to Bombay, where she underwent a thorough repair. The Castle Huntly, after losing two anchors, very narrowly escaped the same fate. To avoid these dangers, it is advisable to give the islands a birth of a mile and a half, particularly the southern one. Before quitting the Straits of Sunda, it will be proper to describe the anchorage in RAJAH BASSA ROADS, which is safe from all winds, except the west-south-west; to this point the ocean is open, and consequently a heavy sea rolls in during these winds, though it may be partially broken by the Three Brothers, which lie from Cocoa-nut Point west by north four miles. It is an excellent place for procuring good water with facility, from two rivulets issuing from the high land nearly abreast of the anchorage, and from a third to the eastward of Cocoa-nut Point, which forms the south extremity of the roads; either of these runs would supply a fleet.

The best anchorage is in twelve fathoms, blue mud, about one mile and a half off shore, Rajah Bassa Peak bearing north-east by east half east, and Cocoa-nut Point south-east half east. This point is low, with cocoa-nut trees overhanging it, and about three miles to the eastward the land rises gradually to an elevated summit. The water deepens towards the Brothers to twenty-seven fathoms, and there is a passage between the Middle and South Brother having eighteen fathoms. These islands appear as one, in coming from the eastward, until near Rajah Bassa Roads, when they begin to separate. The depths from these roads, across the

mouth of Lampoon Bay, are from thirteen to nineteen fathoms.

Flat Point, which forms the western entrance of Sunda Strait, is the southernmost land on Sumatra, situated in 6° 0′ south latitude, and 104° 41′ east longitude, having some rocks projecting from its western side about a mile and a half, and about half that distance from its southern one. The land from this point trends ten miles eastward to Tanjong Chinna, where it winds abruptly to the northward, and forms Keyser's Bay, which is eighteen miles deep from this point, having the island of Keyser about mid-way between the sides of the bay, and eight miles north-east by north of Tanjong Chinna. There is a good passage on either side of this island and the main, and it has a harbour on its north-east side where fresh water may be procured. There are several other places where ships may anchor and water. One of these is about two miles and a half to the northward of Tanjong Chinna; a second four miles to the northward of this, both on the east side of the bay, on Sumatra; and a third at the head of the bay, near the village of Borne. This bay, as well as that of Lampoon, which is much more extensive, appears free from danger as regards navigation, but the greatest caution is necessary, particularly in small vessels, to guard against the Malays, who are known to be a treacherous race. The boats' crews should always be armed, and carefully avoid being surprised when watering or dealing with those pirates; and the officer in charge should endeavour to prevent any quarrels with the inhabitants.

Lampoon Bay is very extensive, having a chain of islands at its entrance, stretching from Tanjong

Teekoos, its western extremity, about half-way across the mouth of the bay. These islands have channels between them, and between the point and the westernmost one, which is called PULO GOONDY, but are not sufficiently known to be recommended. The Arniston, East Indiaman, on her homeward passage, struck on a rock about half a mile north-east from the small island Oomowoomang, which lies near the north end of Goondy. She was one of a fleet from China that worked across Lampoon Bay to keep in smooth water, with a view to pass between Pulo Goondy and Tanjong Teekoos; but this accident induced the others to pass out to the eastward, in a good channel between them and the islet Pulo Saradong, which is covered with brush-wood. When in this channel the Peak of Crocatoa bore south. On the north of Pulo Goondy a small bay is formed, called Nanga Harbour, in latitude 5° 46′ south, and longitude 105° 4′ east, having the small island Pulo Patappan in the middle of the entrance, on the east side of which is the best passage into the harbour, by borrowing on the shore of Pulo Goondy. Here the depths are from fifteen to ten fathoms, and from twelve to seven inside the harbour. Captain Owen careened H. M. S. Baracoota here in February 1811; moored with the west extreme of the harbour north-west one mile; east extreme, north-east half north one mile; extremes of Patappan, north by west to north-north-east, two cables' length from each; one cable's length from the reef, and one mile from the bottom of the harbour.

We now resume the direct outward passage to China. Having passed the narrow part of Sunda Strait, and brought the western extreme of Thwart-

the-way south, if it is intended to take in water at North Island, preserve the above bearing until all the islands to the north-east of Hog Point are passed, the Sumatra shore may then be approached without danger; by this time North Island will be conspicuous, forming the northern extremity of the land. Bring North Island to bear north by east half east, and keep it so until the southernmost of the Three Sisters bears west half south; at which time the northernmost Sister will be north-north-west, and the depth of water eight and a half fathoms, which is a good situation to anchor in, and is about three-quarters of a mile from the Sisters. Some prefer anchoring between North Island and the Sisters, with the White Chalk Cliff on Sumatra west, off shore about one mile.

The SISTERS are three little wooded islands, so near the coast that they are not distinguishable from it until you are near them. There is another small island about two miles to the southward, of the same description. Between the Sisters there is two and three fathoms water, and the coast hereabouts consists generally of a mud-flat. East-north-east of the north end of the North Sister about one mile, there are overfalls from twelve to six fathoms; and also at the same distance, when east half south from the same end (it will then be in one with the White Bluff Cliff), there are overfalls from thirteen to seven fathoms. The Sisters will be found very convenient for wooding, which is a good reason for anchoring near them.

The WATERING-PLACE is on Sumatra, north-west of the Three Sisters, and is about two cables' length to the southward of a remarkable white chalk cliff,

overhung with verdure, and is a long stonecast from the beach, up an uneven pathway, which is used to roll the casks between the watering-place and the boats, where they may either be rafted off in fine weather, or hoisted into the long-boat with a stump-mast, as is most convenient. The water is conveyed in buckets from a small rivulet.

The writer has repeatedly watered there. In March 1817, whilst so employed, with parties from his own and two other ships in company, we were surprised with the sudden appearance of the natives in considerable numbers, making towards us from different quarters. From never having seen any inhabitants here before, and from the manner in which they approached us, we were doubtful what their intention was, and immediately concentrated our little force, having only two or three fowling-pieces, which had been brought on shore for the purpose of killing any game we might discover. In the mean time, the jolly-boat was sent off to obtain a supply of arms from each ship. The natives had now surrounded us, each having his creese in his belt; but, whether from motives of fear or friendship, they evinced no symptoms of attacking us, although their behaviour was far from courteous. On the contrary, their chief, an elderly man, was somewhat imperious, and would, if he had been permitted, have made his own terms in bartering with us for the few fowls and birds they had collected. The price they demanded was one dollar for six or seven fowls, whereas, at Anger, as many dozens might have been procured for the same money. They had no bullocks to offer us. The arms having arrived, and persons being stationed near them in

case of any untoward event, we completed our watering without any molestation whatever. It is, however, highly necessary to be at all times prepared against the attacks of the Malays, who are known to be at once fierce and deceitful. There is another place where water is sometimes procured, a little more to the southward, and nearer to the beach, but it is brackish.

North Island is about two leagues north-east by north of the Three Sisters; it is moderately high, level, covered with wood, and may be seen eight leagues from the deck of a large ship. There is a knowl, with three and a half fathoms water on it, lying south-east of the island, three quarters of a mile distant, having from four and a half to five fathoms close to it on both sides. This island is on the meridian of the west end of Thwart-the-way, in longitude 105° 49′ east, and latitude 5° 41′ south. There is no water to be procured upon it, neither is there any safe passage between it and Sumatra.

From North Island to the Straits of Banca. Being from one to two miles eastward of North Island, steer north-north-east a quarter east for the Brothers, which, with a leading wind, are best passed on their western side; they are twelve leagues north 27° east from North Island. These are two small wooded islands, bearing from each other north 5° east, and south 5° west; when they bear north by east they appear to be touching one another, and from that bearing to north 4° west, when they begin to open, they appear as one. In coming from the northward these bearings will be of course reversed. They may be safely approached within half a mile, and in calm weather may be found convenient for

wooding. A passage with deep water is said to separate them, but it is by no means recommended. Their latitude is 5° 9′ 30″ south, and longitude 106° 5′ east, and they may be seen six leagues from the mast-head of a large ship.

The DOLPHIN ROCK, on which a vessel of that name grounded, is said to be nearly even with the water's edge, and to bear south-south-east two leagues from the Brothers; but its position is not correctly determined.

The SHAHBUNDUR SHOAL is seven miles west by north a quarter north from the South Brother; it is extensive, and is situated at the extremity of the shoal-bank which projects from Sumatra. It is easily avoided, by keeping from one to three miles at most from the Brothers. The Sandwich, East Indiaman, having the North Brother east-north-east a quarter east about three leagues, struck on this shoal, and, after starting her water and otherwise lightening the ship, she was forced over the shoal with a fresh breeze, after grounding three times on the different patches. By not borrowing under nine fathoms on the coast, the Shahbundur will be avoided.

LYNN SHOAL, so named also from the vessel that struck upon it, is about two cables' length in extent, having only two feet water upon some of the coral-patches, of which it consists. It is east 13° south, eight or nine miles from the South Brother, and west 5° north from the North Watcher. The General Hewitt, East Indiaman, grounded and lay twelve hours upon it; a considerable portion being dry at low water. This was about six A. M. on the 5th of August 1820, three days before the new moon, which happened at 9 h. 41 m. on the

8th; hence we may infer, if there be any regularity in the rise and fall of the tide, that it is high water at the Lynn Shoal at full and change about 8 h. A. M. The soundings are from ten to fifteen fathoms all round this shoal, and very close to it.

BROWERS SHOALS, in latitude 5° 5′ south, are two coral-reefs, with a dry patch of sand on each, and separated about a quarter of a mile from one another. They appear one when viewed from the north 17° east and south 17° west, and their extent is a mile and a quarter in breadth. They bear from the North Brother, east by north half north to east-north-east a quarter north, about ten or twelve miles, and their south-west extremity is north 54° west, about thirteen miles from the North Watcher. They are best avoided by keeping to the westward of the Brothers, either in going to or coming from the Straits of Banca or Gaspar. But such as prefer a more eastern track should keep within three or four miles of the North Watcher, and shape their course accordingly; taking at all times great care of the currents, which are very uncertain, both in point of strength and direction. Frequent chronometrical observations, and particularly when out of sight of land, will be of great utility in this, and, indeed, in all other narrow seas. It was a frequent custom with the writer to ascertain the direction of the current by means of the lead and lead-line, by having a small buoy or keg ready to bend on to the line the instant that the lead was on the ground, allowing a few fathoms over and above the depth of water, and then paying out the line from the ship; when, if there was any current, the buoy would immediately swing to the lead, and the water

would be seen to pass the buoy, which would consequently be stationary, and the ship's position from the buoy, by the time the whole line was run out, would give a fair method of determining both the direction and rate of the current. In calm weather, the lead alone, independent of the buoy, would answer the purpose, and point out the necessity of anchoring, or the contrary.

The NORTH WATCHER, in latitude 5° 12′ 30″ south, and longitude 106° 32′ east, is, like most of the islands in this sea, covered with wood, is tolerably level, and may be seen from the mast-head six or seven leagues. It lies in the track of ships from Batavia to the Straits of Banca or Gaspar, and may be passed from one to three miles on the east or west sides, in soundings from eleven to twelve fathoms. A coral-reef, having only six feet water upon it, projects around the south end to the distance of half a mile, with a rock in one place above water, which is the principal danger about this island.

OMEGA SHOAL, lately discovered by an American, with from ten to thirteen feet water on it, is coral rock about sixty or seventy yards in diameter, bearing east by south from the south end of the North Watcher, about one mile and a half distant, with twelve fathoms water between the island and shoal.

From the Brothers to Lucepara the course is north a quarter east, in soundings from nine to twelve fathoms: the current in this passage is variable, but runs most frequently to the eastward. The coast of Sumatra, between the Brothers and Lucepara, is low, and may be seen, when in ten fathoms,

from the deck; at other times it cannot be observed from the mast-head. Tree Island Bank projects about five leagues from the coast, in latitude 3° 50′ south, its extremity bearing south by west, from the island of Lucepara, having hard ground and overfalls just without it. There is also a sand-bank, having four and three quarters fathoms on it, bearing south-south-east from Lucepara Island, in latitude 3° 45′ south.

Lucepara Island is in latitude 3° 13′ 30″ south, and longitude 106° 12′ east, and is 4½′ to the eastward of the meridian of the Brothers. As you approach this island, haul over to the Sumatra shore, so that when it bears east you may be about four miles from it, when the First Point of Sumatra will bear about north by west three quarters west; endeavour to keep it so, and avoid going to the westward of that bearing. If the weather is clear, the western brow of Parmesan Hill will be seen in one with the First Point of Sumatra: this is the mark to lead you clear of the shoals to the north-west of Lucepara Island, the most dangerous of which is, by compass, north 55° west of the island, leaving only a narrow passage between it and the mud-flat off the Sumatra coast, which is at most from two to three miles in extent. The soundings in this passage are from four and a half to five and a half fathoms, generally hard sand towards the eastern side of it, and muddy bottom on the Sumatra side. Here it would be advisable to send a boat to lie upon the western edge of the Two-fathom Bank until you have passed it, and at the same time to try the current; for which purpose the ship may be hove-to or anchored, with the island bear-

ing from east-south-east to east, distant about seven miles. The Two-fathom Shoal will then be north two miles. The boat being placed upon the shoal, as before directed, the ship may now proceed; and, having passed the Two-fathom Bank at the distance of about one mile, endeavour to preserve a north or north a quarter west course, until the First Point of Sumatra bear west-north-west, when you will have escaped all the dangers. A boat proceeding ahead of the ship, if well managed, is an additional security in this narrow passage.

The passage between Lucepara and Banca is so very intricate and full of shoals that it is seldom or never attempted, and ought not to be used but in cases of emergency. With regard to the preference, where there is an option, of proceeding by the Straits of Banca or Gaspar, either in going to or returning from China in the regular seasons, the author has no hesitation in advising the former, as much less dangerous. He has sailed through them a dozen times, without any accident or alarm, save on one occasion, when homeward bound, on the 7th of March 1817. In passing the narrows off Lucepara, when keeping too close to the Sumatra shore, the Cuffnells grounded on the mud-flat which projects from that shore. The bearings by compass were as follow:—Lucepara Island south-east, the extremes of Sumatra from south to north by west half west, distance from three-quarters to one mile at farthest; Mount Parmesan a little open to the eastward of the First Point. The ship having grounded at high-water, the attempt to back her off by the sails proved fruitless; but by the assistance of the boats of the fleet, the stream-anchor

was carried out to the north-east, and the end of the cable brought to the capstan through the after-port on the starboard side of the quarter-deck; and at 2 A. M., after lying aground exactly twelve hours, upon heaving at the capstan, the ship floated; when the end of the stream was passed out of the port to the hawse-hole, the bight slipped from abaft, the anchor weighed, and the ship being towed into a quarter less six fathoms, brought up with the best bower, and prepared for sailing at daylight. The ship sewed three feet five inches forward, and eighteen inches aft. Moon fourteen days old. Having brought the First Point of Sumatra west-north-west, give it a birth of one mile or one and a half, and in not less than ten fathoms; you will then have the strait open, and, wind and weather permitting, may steer north-west for the Second Point of Sumatra, on which there is a high tree. The soundings here are from thirteen to eighteen fathoms, deepening to twenty on the Banca side, and shoaling on that of Sumatra, where the coast is bounded by a mud-flat, that projects in various places from two to three miles from the land: a due attention to the lead and the setting of the tides will always apprize the navigator in time to alter his course and avoid the consequences to which a bad look-out might subject him. The tides here are very irregular, and influenced greatly by the prevailing winds, the flood running in at both ends of the strait and meeting about the Nanka Islands, which are nearly in the middle. In the westerly monsoon, during the rains, the freshes set out of the rivers on the Sumatra coast toward the opposite shore, and in the night should be attended to.

There are sometimes two floods and two ebbs in twenty-four hours; at other times only one of each. When strong south-east winds prevail, the flood runs rapidly into the southern part of the strait fourteen or sixteen hours, and the ebb in the opposite direction eight or ten hours. In winter, particularly in December and January, the current being influenced by the north-west and northerly winds which then prevail, runs strong out of the southern part of the strait from twelve to eighteen hours, having only a slack or weak indraught for the remainder of the twenty-four hours, when the water rises over the ground. In this particular season it is almost impossible for an indifferent-sailing ship to get through to the northward. The velocity of the tide on the springs is from three to four miles an hour, and the perpendicular rise about nine feet, both within and without the strait.

Point Lalary, on Banca, is ten miles north-west by north from the First Point, and free from any known danger, having twenty fathoms water within a mile and a half of the shore.

Second Point is nearly north-west from the First Point, distant nine leagues, and may be approached within about two miles, in not less than ten fathoms water.

Carang Timbaga is a dangerous shoal, about two miles from the Banca shore, and from that of Sumatra between one-half and two-thirds channel over towards Banca. There are several dangerous patches upon it, one of which is about two miles from the latter shore, seen by Captain Rush of the Royal Charlotte in 1813, bearing east from that ship about two miles. The bearings at that instant

were, Parmasang Hill north-east; Point Lalary south-east half south; Second Point of Sumatra west three-quarters north.

The best course in passing from the First to the Second Point is not to exceed half the distance from the Sumatra shore to that of Banca; in which case you will have from twelve to eighteen fathoms, and not more than five miles from Sumatra. The coast between the first and second points forms a deep bay.

PARMASANG POINT, on the Banca shore, is steep-to, having five fathoms very near it. Between this and Nanka Point the coast forms a deep bay, with overfalls and foul ground, making this side of the strait far less safe than the opposite one.

The THIRD POINT is twenty miles north-west by north from the Second Point, and west-north-west three-quarters north from Parmasang Hill. It is bolder than the first or second, and has thirteen fathoms one mile south-west half south of it, and only three feet at a quarter of a mile from it. Between the second and third points a deep bay intervenes, having a shoal flat, extending in some places four miles from the shore. To avoid this do not bring the second and third points in opposition, but rather keep the Second Point south-south-east half east until the Third Point be west from two to three miles.

The NANKA ISLANDS, in latitude 2° 25′ south, longitude 105° 42′ east, are three in number, from four to five miles from the Banca shore. The most eastern, being the largest, is moderately elevated, and contains several springs; but that on the north-east side of the island is considered as affording the best water, and as the most convenient for boats to

approach. There is also abundance of wood, but there being no inhabitants, stock cannot be procured. The two others are covered with wood, the middle one being the least elevated of the three. There are rocks between them and Banca, which render the passage unsafe; there are also other rocks, one of which is about half a mile west of the most westerly island. A reef projects from the north-west side of the Great Nanka, about two cables' length, having rocks above and under water. There is a spring on the south-east point of the island, and one on the west side of the Great Nanka, with a sandy beach, which may be convenient when the boats cannot lie on the north-east side. The best anchorage for large ships in winter, that is, from December to March, and probably at any season, is obtained by bringing the south end of the great island east by south, the westernmost island north-west, in seven fathoms, stiff clay, and about one mile from the great island. The holding-ground is so good here, that after breaking the messenger and a new lower shroud hawser, the writer was under the necessity of lashing a top-block on to the cable, and doubling the purchase, before the anchor could be weighed.

FOURTH POINT, in latitude 2° 20′ south, is seven leagues west half north from the Third Point. Having brought the latter to bear south-west, distant from one to two miles, steer west by north, having regard to the set of the current, so as to pass about two miles from the former, and not coming into less water than seven fathoms on the Sumatra shore; which is bounded by a mud-flat at various distances from the land, of from half a mile to three or four miles off Palambam River, of which a careful atten-

tion to the lead will give due warning. This is by far the safest side of the strait. The coast of Banca, from the Nanka Islands to Mintow Bay, has in some places foul ground and overfalls, which render this side precarious.

Having arrived off the Fourth Point, Monopin Hill will be nearly north. Continue along the edge of the bank in from seven to eleven fathoms, keeping the lead going quickly, and not deepening the water to more than twelve fathoms, on account of the Carang Hodjee Shoal and outer bank of Mintow. The Carang Hodjee is five miles south-west of Mintow Point, and is extensive and dangerous.

From this shoal, in an east by south direction, the outer bank of Mintow extends about twelve miles, having various soundings, from seven fathoms to being nearly dry at low water on the eastern end, where it is connected with the Carang Bram Shoal, which terminates these dangers. Between those last mentioned and Banca, is a safe passage to Mintow Roads, which should not, however, be adopted without great care by strangers: with a leading wind, keeping Tan Pooni Point from east half south to east by south will carry you to the northward of the Mintow Bank to the anchorage in Mintow Road.

To sail in Mintow Road, a ship may pass on either side of Carang Hodjee; if on the east side, bring Monopin Peak to bear north-north-east, and with this bearing steer for Mintow Town: you will thus be carried over the bank in from six to three and a half fathoms, hard sand. When the bank is passed the water deepens to twelve and thirteen fathoms, and shoals again quickly toward the inner bank and the shore. The best anchorage is with Monopin Peak

north by east; Tanjong Pooni east by south half south; Mintow west three-quarters north, in ten fathoms, off the town about two miles. With a working wind, keep the hill between north and north-north-east in crossing over the Mintow Bank, and on no account bring the hill to the westward of north until you are over it. A ship coming from the northward, and intending to enter Mintow Road between Mintow Point and Carang Hodjee, having brought Monopin Hill from east to east by north, may approach the Banca shore within one mile, being careful not to go under eight or nine fathoms until she nears Mintow Point, which may be passed within half a cable's length; then steering east by south until Monopin Hill bears north by east, she will be in a good birth for anchorage.

Note.—The passage between Mintow Point and Carang Hodjee is a mile and a half broad, having from seven fathoms near the point to sixteen towards Carang Hodjee.

Resuming the direct passage to China, and having kept along the bight on the Sumatra shore, in from six to eight fathoms, and not deepening to more than nine on the western side of Carang Hodjee, steer north by east, still along the bank of Sumatra, until Monopin Peak bears south-east, when you will have passed all the dangers of the Straits of Banca.

The FREDERICK HENDRICK consists of several rocks, lying about midway between the west end of Banca and Batacarang Point. The best way to avoid them is to keep the Sumatra shore on board, in six or seven fathoms, whilst Monopin Hill bears from east to east-south-east half south.

Having brought Monopin Hill to bear south-east,

steer north by east, to pass to the eastward of PULO TAYA, which is a small bold island, with two hummocks, having a saddle-like appearance, and near its north-east side two little detached rocky islets. This island may be seen from the mast-head ten or twelve leagues. Its latitude is 0° 45′ 30″ south, and longitude 104° 58′ east. The soundings from the Frederick Hendrick to Pulo Taya are from seven fathoms, increasing gradually to fourteen; and there is frequently a current from one to two miles an hour setting to the south-east, which should be guarded against on account of the

SEVEN ISLANDS,—Pulo Topjoo of the Malays. This group extends seven or eight miles in latitude, and may be seen seven or eight leagues off. The north-westernmost of them is in latitude 1° 8′ south, and longitude 105° 24′ east, according to Captain Ross' observations. This islet is barren and rocky, having a small rock above water, about half a mile to the westward of it, which should be carefully avoided in the night, the soundings being of little assistance to point out its proximity.

PULO TOTY, in latitude 0° 58′ south, longitude 105° 42′ east, is north-east by east, three leagues from PULO DOCAN, with from fifteen to twenty fathoms, muddy bottom, having a safe passage between them, as also between Pulo Docan and the Seven Islands, the soundings between which are from fourteen to sixteen fathoms, mud. Pulo Docan is in latitude 1° 2′ 30″ south, longitude 105° 36′ 30″ east.

Being from two to four leagues east of Pulo Taya, steer north-north-east, keeping the east end of Pulo Lingin to the westward of north, to give a good birth to the Ilchester Shoal, which lies nearly on the me-

ridian of the east end of Lingin, having care of the current, which is generally, but not always, easterly. Cross the equator in about 105° 30′ to 105° 40′ east, and then preserve a north course up to the parallel of one degree north latitude, which will be best effected by a due regard to the chronometer. From latitude 1° 0′ north, and longitude 105° 30′ east, steer north by west, which, barring currents, will carry you just without Pulo Aor, which may be passed at any convenient distance from three to six or eight leagues. The soundings increase gradually from Pulo Taya, fourteen fathoms, to Pulo Aor, in thirty-two fathoms.

The Ilchester Shoal, in latitude 0° 26′ 30″ south, is eight or nine miles south 6° and three-quarters west of the east end of Lingin. It extends north by east and south by west two miles and a quarter, and is a mile and a half broad, having only one fathom upon the shoalest part, and from which Pulo Taya bears south 4° half west; the islet off the east end of Lingin north 13° half east. The depth of water decreases nearly all round from eighteen to fifteen, and suddenly to five and three fathoms on the edge of the shoal. To avoid this shoal do not bring Pulo Taya to the southward of south by west half west, nor the islet off the east end of Lingin to the eastward of north.

The Geldrias Shoal is in latitude 0° 48′ north, and longitude 104° 59′ east, extending a mile and three-quarters in a north-east and south-west direction, having from one and a half to four fathoms on it; nineteen or twenty fathoms close to its eastern part; from eight to eleven and twelve fathoms irregular near the south-west and western sides, deepening to fifteen fathoms close to the Boat Rock,

which is formed of three low rocks, that may be seen four miles from a ship's deck. From Geldrias Shoal the Boat Rock bears north-north-west three-quarters west two miles and a half; Ragged Island, north-north-west eight miles and a half; Pulo Panjang, north-west by north five leagues; Saddle Island, west eight miles; and South Island, west-south-west, which has several little islets near it, and is situated near the south-east part of Bintang. Saddle Island is in latitude 0° 48′ north. Ragged Island, in latitude 0° 56′ 30″ north, longitude 104° 56′ 30″ east, is small, but high, and may be seen seven or eight leagues in clear weather, and is the most eastern of all the islands which are situated to the east and south-east of the large island Bintang.

The White Rock, in latitude 2° 18′ north, longitude 105° 33′ east, is east 12° south of Pulo Aor, distant from eighteen to twenty leagues; Pulo Domar, bearing from the White Rock north-north-west ten leagues, is in latitude 2° 45′ north, and longitude 105° 23′ east. It is a high barren rock, with from thirty-four to thirty-six fathoms water between it and Pulo Aor, forming the eastern extremes of the passage between them.

Saddle Island (of the Anambas) is twenty-nine miles south-east half east of Pulo Domar, and north-east a quarter east five leagues from the White Rock. It is about the same size as Pulo Domar, latitude 2° 27′ north, longitude 105° 46′ east.

Pulo Tingy bears west-south-west from Pulo Aor, and is conspicuous by a very high peak, which, rising gradually from the low land near the sea, terminates in a sharp spire or cone. A chain of islands projects three leagues south-south-east of

the principal one, the outermost being a round bluff rock, in latitude 2° 8′ north, and four or five leagues from the main. There is another small island inside of Pulo Tingy, and closely adjoining it, which is on with the peak bearing north-north-east half east; and north-west by north from this small island there is a rock about the size of a boat, off a bluff point on the main, which forms the northern extremity of a bay. From the north-west point of Pulo Baby, an island of considerable size, and the nearest to the northward of Pulo Tingy, the rock just mentioned bears north-north-west a quarter west. This and the other rocks near the mainland are not high above water.

The passage between the main and the above islands is safe in daylight, with regular soundings, six or seven fathoms near the main, and from twelve to fourteen near Pulo Tingy. The course through is about north-west by north; but it would be dangerous to attempt it in the night, on account of numerous islets and some rocks. On the north side of Pulo Tingy, in a small bay, there is a village, around which are cocoa-nut trees and bananas; and a watering-place on the south end of the island. Latitude of Pulo Tingy 2° 17′ north, longitude 104° 11′ east.

Pulo Aor, in latitude 2° 29′ 30″ north, longitude 104° 34′ 30″ east, is small, high, and covered with trees, formed of two hills, which give it the appearance of two islands when seen in a north-east or south-west direction; but when it bears north-west, the hills are in one. It may be seen in clear weather fifteen or sixteen leagues from the deck: at such times Pulo Aor and Bintang Hill are visible when

you are midway between them. Close to the south-east point of Pulo Aor there is a small islet covered with trees, and another contiguous to the north-west point of a bay, which is situated on the south-west side of the island, affording good shelter in the north-east monsoon, when the wind is any way between north and east-south-east.

Pulo Pisang, in latitude 2° 37′ north, is five leagues north-west by west of Pulo Aor, which it resembles when seen in hazy weather, bearing to the south-west or southward; for it consists of two hills, and a gap between them, though not so high as Pulo Aor. It has no inhabitants; but there is a bay on its south-west side, where a ship may anchor in eighteen or nineteen fathoms water, one mile from the shore. A remarkable perpendicular rock will be seen on the side of the hill, close to the sea.

Pulo Timoan, the largest of these islands, extends from 2° 44′ to 2° 54′ north, and both the north and south ends are in longitude 104° 15′ east; its breadth is from four to five miles, and it may be seen at the distance of twenty leagues. At the north-west part of it there are four small islets, having a deep safe passage between them and Timoan, which may be adopted by ships coming from the northward, and intending to anchor in the bay on the south-west side of the island, which is in latitude 2° 48′ north, and affords good shelter from north-east winds. In coasting the west side, keep from one and a half to two miles from the shore. The water shoals gradually in the bay to nine fathoms, but the best anchorage is in fifteen or sixteen, with the island bearing from east-south-

east to north-north-west, and the middle of the Sandy Bay north-north-east half east. There is a small river on the east side of the bay, where boats can fill their water; but a bar at the entrance of it prevents their going in and out at low water. There is also a rivulet on the north-west side of the bay, where water may be filled at all times; and firewood may be had in abundance near the shore. There being no inhabitants in this part of the island, no refreshments can be got. Other districts of it are occupied, but are so little known to Europeans, that the people ought to be carefully dealt with, to avoid that treachery which is so prevalent among the Malays. The south end of Timoan is remarkable for two high peaks, called the Ass's Ears; and at the foot of the hill which forms their base is a stream of fresh water, running over a stony beach into the sea. From this watering-place the Peak of Pulo Tingy bears south 6° west, the centre of Pulo Pisang south 50° east, and the extremes of Timoan from east to south 68° west. About two leagues south-west from the Ass's Ears is a small island, and also another rocky islet, between which and Pulo Timoan's south-west end the passage is safe, in depths from fifteen to twenty fathoms, within one mile and a half of the latter. In fact, there are no known dangers about any of these islands that are not visible in daylight; but they are so numerous on the west side of Timoan that it would be hazardous to run in the night. The above remarks are given in the event of necessity; but the direct passage, either outward or homeward to China, is to the eastward of these islands. In thick weather and in the night, the soundings, if well attended

to, will be important guides. Thus, north of and near Timoan, there will be twenty-five fathoms, eastward of it from twenty-seven to twenty-eight, about five leagues off. This is a proper depth to keep in during the night, until Pulo Pisang bears west-south-west about four leagues, when the soundings should be increased to thirty-two or thirty-three fathoms, to pass to the eastward of Pulo Aor.

PULO VARELA, in latitude 3° 16′ north, is north-west ten leagues from the north end of Timoan, and four leagues from the main. With the exception of a few bushes upon its summit, it is a barren rock, visible about five leagues off. There is a ledge of rocks even with the water's edge, about one and a half to two miles north of it, on which the sea breaks in bad weather; and about two leagues to the north and north-north-east of it, there is a rocky bank having overfalls, with five fathoms, which is the least water that has been found upon it. To avoid this and other banks about Pulo Varela, keep in from twenty to twenty-two fathoms. The channel inside of Pulo Varela is very safe, and generally has regular soundings.

PULO BRALA, in latitude 4° 47′ north, and longitude 103° 37′ east, about six leagues from the main, is of considerable size, and may be seen ten or eleven leagues. When it bears south 8° west, its summit appears flat, but when south-west and west it rises in hummocks. It should be avoided in the night, as there are small islets to the north of it, and also a black rock about two miles from its southern extremity. The depths outside of it, to the north-east, are from thirty-four to thirty-five fathoms at four or five leagues' distance.

Pulo Capas, in latitude 5° 15′ north, is about three and a half leagues south-eastward of Tringany Road. Near the main it is rather low, and there is no safe channel between it and the coast; but a small vessel might venture through in case of necessity.

Tringany River's Entrance, in latitude 5° 21′ north, longitude 103° 4′ east, bears north-north-west twelve or thirteen leagues from Rocky Point, and is a place of considerable trade, where pepper, and sometimes a little gold, is procured. Hitherto ships have been unmolested by the inhabitants; for the rajah and the government are more friendly to strangers than those of other Malay ports. Water, provisions, fruit, and vegetables, are abundant. The best anchorage is in seven fathoms, with the flag-staff south-west by west; Redang Islands, north a quarter west to north-north-west half west; Pulo Capas, south-east half south, distance from the mouth of the river about two miles. This road is considered safe from March to September; but it is prudent to leave it before the equinox, although north-east gales seldom occur before the middle of October, when they are generally preceded by a westerly wind, which veers round to north-east.

Redang Islands, extending from latitude 5° 33′ to 6° 4′ north, are an extensive and elevated group, having a channel between them and the main. Pulo Printian, in latitude 6° 4′, is six or seven leagues west-north-west from the large Redang. It consists of two high islands, separated by a narrow gut at their southern extremities, but opening into a large bay to the northward, exposed to north-east or northerly winds, but well sheltered during the south-west monsoon. The soundings decrease

regularly from fifteen at the entrance to five and four fathoms close to the shore on each side, and to six fathoms near a ridge of rocks at the bottom of the bay. Turtle are got in a sandy bay on the north-east side, and kimo or large scallops have been found, which afford good refreshment. On the north-east part of the most northern of the group there are four small islets, one of them remarkable for having a round bluff aspect.

From Pulo Aor, to pass at a proper distance from PULO CONDORE, the course is north-north-east, which will carry a ship from ten to fifteen leagues to the eastward of that island, its latitude being 8° 40′ north, and longitude 106° 42′ east. The latter consists of several high woody islands, the principal of which is three leagues in length north-east and south-west, and from two to four miles in breadth. The largest is formed of a ridge of mountains, and inhabited by people from Cambodia and Cochin-China, who continue tributary to that government. They reside in a village on the south-east side in the Great Bay, where, in 1702, the English settled and built a fort, but, as formerly mentioned,* were, a few years afterwards, nearly all cut off in the night by Macassar soldiers in their employ. This bay is fronted by several islands to the south and east, with soundings in it from six to fourteen fathoms, but is rather exposed to easterly winds. There are three channels into it: that between the south point of Condore and the small isles adjacent is very narrow; that between the east end and the islands opposite has the deepest

* Supra, vol. ii. p. 341.

water; the other, fronting the bay on the south-east side, is widest, having from four to seven fathoms water. In entering it, the White Button and island on the north-east side should be approached; for there the deepest water is found. The village is on a plain at the bottom of the bay, and the inhabitants subsist chiefly on yams, pumpkins, fruit, and fish. The chief of the village has instructions from the King of Cochin-China to furnish pilots to ships that touch here, and are bound to Cape St James' Bay. The harbour of Pulo Condore is formed between the west end of the principal island and an adjoining high one, sometimes called Little Condore, the south-east point of which nearly joins the former; but they are separated about half a league to the northward, at which part is the entrance of the harbour. Here the depths are ten and nine fathoms, mud, decreasing gradually to five, four, and three fathoms near the flat that occupies the bottom of the harbour, which is dry at low water. This harbour is sheltered by the surrounding hills, and fresh water may be procured on the east side at a small bay, that on the western shore being brackish. The tides rise three or four feet, and it is high water at full and change at three hours. On the north side of the entrance there are some islands with a passage between the outermost and the others. About one league east-north-east from the north-east end of Pulo Condore, there is a barren white rock. These islands abound with timber, but swarm with reptiles, and there are no articles of trade to be procured; the soil is generally dry and unfruitful, and the air unhealthy, leaving no other inducement to touch at them except when an accident renders a harbour in-

dispensable. The variation here, as all over the China Sea, is about 2° easterly.

The BROTHERS are a couple of small islets about two miles and a half apart, and bearing of each other east-north-east three-quarters north, and west south-west three-quarters south. The westernmost is a barren rock, not more conspicuous than Pedro Branco, at the entrance of Sincapore Strait, having high breakers on its eastern side during blowing weather. The easternmost is a high round islet with trees on its summit, bearing west by south eight leagues from the centre of Pulo Condore.

The soundings between the Brothers and Pulo Condore are from twelve to seventeen fathoms near the latter, and from the Brothers to Pulo Oby, from twelve to fifteen fathoms, and shoaling gradually towards Cambodia. When Pulo Condore bears north by east and north ten leagues, the soundings are from eighteen to nineteen fathoms; when north-west seven or eight leagues, they are from twenty to twenty-one; west twelve leagues, twenty-four; west twenty leagues, twenty-seven; and there appear to be soundings so far to the eastward as to touch an imaginary line drawn from Pulo Sapata to the Natunas Islands. From Pulo Condore, in steering direct for the Great Catwick, the depths increase very slowly until within twelve or fifteen leagues, and when near it they rise rather quickly, from thirty to thirty-four, forty-five, and fifty fathoms.

Captain Owen of the David Scott, has recently discovered a shoal apparently of two miles in extent, composed of black and white coral, on which he had from six to four and a half, and one-fourth less four fathoms, which he places in latitude 8° 8′

north. Longitude 111° 59′ east, by two chronometers agreeing in a run of ten days from Macao. It is called Owen's Shoal.

Being about ten leagues to the eastward of Pulo Condore, the course to Pulo Sapata is north-east by east, which will carry a ship, barring currents, within ten miles to the eastward of that island, whence the course to pass over the middle of the Macclesfield is north-east by north, and thence to the Grand Ladrone north half west. But in the present improved state of navigation there is no necessity for passing over the Macclesfield, but rather midway between it and the Paracels; the most dangerous point of which, towards the coast, is the Lincoln, in 112° 43′ east, and the next in the way is the Bombay Shoal, its latitude being from 16° to 16° 3′ north, and longitude of the east end 112° 36′ east. By adopting a middle passage between the Paracels and the Macclesfield a considerable angle is avoided, and although at present there is not less than eight fathoms upon the latter, from the progressive vegetation of the coral, of which this bank is principally composed, it may, in the course of time, be dangerous for large ships to pass over it when the sea is running high. The western end of this bank is on the same meridian as the Grand Ladrone.

The Royal Bishop's Shoal is in latitude 9° 40′ to 9° 48′ north, and longitude 108° 20′ east, lying in a direct line between the Great Catwick and Pulo Condore. The least water upon it was seven fathoms in 1809; but probably there is considerably less now, and it should be carefully avoided by large ships.

Pulo Sapata, or Shoe Island, in latitude 10° 0′ north, and longitude 109° 3′ 30″ east, is the far-

thest east of three islands called the Catwicks, and may be seen ten leagues from the deck of a large ship. When it bears north seven leagues, its form is that of a haycock; when north-north-west half west three leagues, it is like a shoe or slipper with the toe to the south-east; when west three quarters south five leagues, it is more elongated, and the highest part, about one-third from the heel or north end, which is then nearly perpendicular, leaning a little to the north at the top.

Pyramid, or Little Catwick, is two miles north-west by west from Pulo Sapata, leaving a safe passage between them. It is a small barren rocky isle, terminating in a peak at the summit, and may be seen about six or seven leagues. Several large ships have accidentally and unintentionally sailed through this narrow passage at night. To avoid this circumstance great care should be taken in passing these islands; the current in the south-west monsoon generally setting to the north-east, and in a contrary direction during the north-east monsoon.

Round Island, or Great Catwick, nearly the same size and height as Sapata, from which it bears west-north-west quarter north, distant about three leagues and a half, is barren, and may be seen about nine leagues. Its latitude is 10° 6′ north. It is nearly south from Pulo Ceicer de Mer, between which and the Catwicks the passage is safe and capacious, with soundings of from twenty-five to thirty fathoms near Pulo Ceicer de Mer, deepening to forty-five and fifty in mid-channel and towards the opposite shore.

La Paix Rock, one mile and a half east from the south end of the Great Catwick, is sharp pointed

and even with the water's edge, having from twelve to fifteen fathoms all round it within a few yards. The author saw the breakers upon this rock, when passing between it and the Great Catwick, during the night of March 13, 1805, in company with H.M.S. Athenienne and fleet, who all miraculously escaped the danger, although several of the ships sailed close to it on both sides. The situation, however, of all these dangerous points has now been accurately laid down by Captain James Horsburgh from a variety of information in his possession, but more particularly from the admirable and laborious survey of the China Sea by Captain Daniel Ross of the Bombay Marine; so that, with a due regard to the chronometers and lunar observations, it would be unpardonable for the leader of a fleet to bring his ships into the precarious situation above mentioned, when this might easily have been prevented by due observations of the chronometers, which would have discovered the south-west current that was the cause of the accident.

Pulo Ceicer de Mer. The centre of this island is in latitude 10° 32′ north, and longitude 108° 53′ east, and extends north-east and south-west four or five miles. Two small hills form its extremities, one sloping and the other conical, and being discerned at a distance of about eight leagues, give it the appearance of two islands. A rocky islet, high above water, lies four or five miles off its north-west end, and there are rocks projecting about a mile, with a reef both from the north and south-east parts. This island is easy of access on the west side, where a ship may anchor if necessary. It is well cultivated, and inhabited by fishermen, paying an annual tribute in salt-fish and

birds-nests to the King of Cochin-China. The soundings do not extend far to the eastward.

The channel between Pulo Ceicer de Mer and the Holland's Bank is from three to four leagues wide, and appears safe; having from twelve to nine fathoms, irregular rocky ground, and eight near the bank.

HOLLAND'S BANK. When at anchor in eight fathoms on its southern extremity, Captain Ross observed the latitude to be 10° 37′ 15″ north, longitude 108° 40′ east; the south-west hill on Pulo Ceicer de Mer bearing south 78° east, fifteen miles and three-quarters, and the peaked rock north 87° east, distance twelve miles. It extends north-east by north three miles and a quarter, having three fathoms and a half water in 1817; the south-west hill on Pulo Ceicer de Mer bearing from its north extremity south 65° east. To clear the north end of this bank, do not bring Pulo Ceicer de Mer to the eastward of south-east. H.M.S. Grampus, the Glatton and Canton East Indiamen, struck on the western side of this bank when homeward bound in January 1805, in latitude 10° 38′ to 10° 41′ north, at which time the low land between the hills of Pulo Ceicer de Mer was in sight from the quarter-deck of these large ships.

The BRITTO BANK, in latitude 10° 30′ 42″ north, longitude 107° 49′ east, extends a mile and a quarter east-north-east and west-south-west, having on its shoalest part only two fathoms water, and all round it from seven to nine fathoms, increasing to fifteen about a mile and a half to the eastward, and to seventeen fathoms about three miles and a half in the same direction. From the Macclesfield Shoal to the Grand Ladrone, during the regular season (south-west monsoon), the course, as before observed, will be north

by west, or thereabouts. The object of the navigator is now to make the Grand Ladrone, bearing from north to north-north-east, and pass in by the western channel between Potoe and Montanha; but, late in the season, or when the winds incline to the eastward, it is best to make the Grand Lema, passing to the eastward of it, and proceeding by the Lema Passage, where, and amongst all these islands, are several pilots who are constantly on the look-out for ships bound to Macao Roads. In the event, however, of the approach of bad weather, and in the absence of a pilot, a stranger may, with the assistance of Captain Ross' and Mr Horsburgh's admirable instructions, proceed safely to shelter under Lintin, where there is far less danger in a typhoon than in Macao Roads, which are greatly exposed to southerly winds, and have less depth of water than the other. It may be observed, that there are few hidden dangers between the islands fronting the mouth of Canton river, and that, in case of necessity, a stranger may push through them in tolerably clear weather with impunity.

The GRAND LADRONE,—Tye-man-shan of the Chinese,—is in latitude 21° 57′ 10″ north, longitude 113° 44′ east. It is steep and bold, having a dome or round mount on its north-west side, which distinguishes it from any other island in the neighbourhood. It may be seen fourteen leagues from the masthead of a large ship, and nine from the quarter-deck. On the south-west part there is a small bay, where pilots and fishermen take shelter in the north-east monsoon. The island is about two miles in diameter, with a rocky aspect close to the sea, but is safe to approach, there being sixteen and seventeen fathoms

water near it. It is the outermost island of its meridian, and, with the Little Ladrone adjoining, and Potoe to the north-north-west, bounds the east side of the great channel leading to the river and Macao Roads.

The LITTLE LADRONE is situated to the north-west of the Grand Ladrone, from which it is separated by a narrow passage, having from sixteen to seventeen fathoms water in it, but too confined for a ship, unless in case of necessity. Near its west side the depths are ten and eleven fathoms, decreasing gradually to six fathoms about half a mile to the southward of Potoe. Close to the north-east of the Little Ladrone is a small rocky islet, and 1200 yards from it north by west there is a small black rock, covered at high water with ten fathoms close round. There is also another high rock contiguous to the north-west side of the Little Ladrone, having nine and ten fathoms near it. These are the only dangers connected with this island.

POTOE, or PASSAGE ISLAND, in latitude 22° 2′ 6″ north, is four miles and a half north-west by north from the north-west end of the Little Ladrone. It is a flat sloping rock, visible three leagues from the deck, with six fathoms all round; it is, however, on account of the tides, advisable to give a birth of not less than half a mile in passing to the westward of it. The passage between this island and Montanha is about five miles broad and perfectly safe; the depth is six and six and a half fathoms in mid-channel, or rather nearest Potoe, which is the best track, decreasing over a bottom of soft ooze to five fathoms and a half in steering north-north-eastward for Macao Roads. Close to the south-east point

of Montanha, there are three fathoms and a half. About ten leagues south from the Grand Ladrone, the depths increase to twenty-seven or twenty-eight fathoms; about twenty leagues from it to forty-four; and soundings extend on the same meridian to the parallel of 20° north latitude. Hence they continue westward to Hai-nan Head; but to the eastward of the Grand Ladrone the water is deeper. Ships falling in with the land in thick weather, may judge of their situation by the soundings, which are from twenty-three to twenty-four fathoms nearer the Ass's Ears, and the Lemas on the outside of them; but between the Grand Ladrone and St John's they are only ten and eleven fathoms, at a considerable distance to the southward of them. The Ladrones are large, and of regular appearance, resembling a coast; whereas, except the Grand Lema, the islands to the eastward are detached, high, and uneven.

The Ass's Ears,—Ky-poong of the Chinese,—is seventeen miles east 10° south of the Grand Ladrone, latitude 21° 54′ north, longitude 114° 2′ east, so named by the English from two peaks on its north-east side, which, sloping off suddenly, give them the appearance of an ass's ears, whence they cannot be mistaken for other land in the neighbourhood. This island, with several smaller ones to the south-west of it, forms a middle group between the Lemas and Ladrones, and they are the southernmost of all the islands in this part of the ocean; the Gap Rock, or Man-mee-chow of the Chinese, being most so, namely, in latitude 21° 48′ north, longitude 113° 58′ east. There is also a group of small islets off the north-east end of the Ass's Ears, called the White Rocks, which form

the south-west side of the channel between them and the Lemas. In this channel is the CAMBRIDGE ROCK, with seventeen feet on it at low water; it is one mile and a quarter distant from the northernmost of the White Rocks, having the Ass's Ears in one when on it. To avoid this, in passing between it and the Lemas, keep nearest to the latter, where there is a safe passage of about a league wide, having twenty fathoms water.

TONG-HOW COVE. The island in which this cove is situated bears north-north-east about two miles and a half from the Little Ladrone, and north from the channel that separates the two Ladrones; it is of moderate and unequal height, extending two miles north-west and south-east. On the north-east side there is a small cove, into which the Boddam, East Indiaman, went when disabled by a typhoon; it is so small as not to be easily distinguished when passing at two or three miles from its entrance. There is a sunken rock off the north-west point of the cove, which will be avoided by passing about three quarters of a mile off shore. Close to the west point of Tong-how, and near the south point of Leung-neeb Island, there is a *small round island*, making the passage on each side of it very narrow; the depth about half a mile off the north side of Tong-how is seven or eight fathoms. The Boddam, after being disabled by the loss of her masts and rudder, having temporary ones, was proceeding towards the river, when the pilot, perceiving another typhoon coming on, ran her into Tong-how Cove. She remained in perfect safety during a violent storm, and her draught of water at the time was twenty-one feet and a half. The cove is about 400

yards wide, with twenty-four feet water in the entrance, seventeen or eighteen feet well inside at low-water spring-tides, the bottom all soft mud. Here a ship may lie with a kedge-anchor, or, in case of loss of anchors, may be safely run into the mud in this cove. The tide rises nine feet, and it is high-water at full and change at six hours and a half. The flood sets north-west, and the ebb south-east, pretty strong outside, but there is scarcely a drain in the cove. On each side the land is steep from the water's edge, terminating in a valley at the head of the cove, where there is a sandy beach and plantain-trees. Good water may be got here, as well as beef, fish, poultry, and fruit; being the chief rendezvous of the fishing-boats in bad weather, or a place of refuge from the Ladrones, it is protected by a fort on the north-west point of the entrance. The rocks that lie along the same side of the cove have twelve feet, mud, within three or four yards of them.

To SAIL INTO THE COVE. Care must be taken to avoid a sunken rock which lies in about six fathoms water, one and a half cable's length to the north-east of the fort point. When the head of the cove bears south-west by west, the rock will be left to the north-westward. Having brought the cove fairly open, bearing south-west by west, steer for the point on the south-east side of the entrance, and pass it within half a cable's length; for the north-west point, where the fort is built, is encompassed by rocks. There is also a reef about two or three cables' length to the south-east of the entrance, which stretches out between one and two cables' length from the south-east part of the island; these are almost all in sight at high water, consequently

easily avoided, by steering from the offing directly for the south-east point of the *entrance*, as before directed.

From the entrance of Tong-how Cove, Ichow and Samoan Islands are in one, bearing east 1° half north to east 7° north; Lin-ting, from east 10° north to east 15° north; Lan-tao Peak, north 40° east; Lintin Peak, north 12° half east; Sam-coke, north 2° west to north 8° west; Ty-lock-chow, north 11° west to north 17° half west; Macao, north 40° west, distant five or six leagues.

The above description, together with most of the foregoing and following directions, are extracted from the excellent work entitled "India Directory," by permission of the author, JAMES HORSBURGH, Esq., and corroborated by comparison with several original journals of the writer. From the indefatigable researches of Mr Horsburgh, and the extensive correspondence he has been in the habit of maintaining, during his long and faithful services as hydrographer to the East India Company, he has rendered his DIRECTORY in every respect an indispensable guide to all ships navigating the Indian Ocean, the China Seas, and all parts to the eastward of the Cape of Good Hope.

II. *Navigation from Bombay to Ceylon, and through the Straits of Malacca, during the South-west Monsoon.* As this monsoon blows directly into Bombay Harbour, the most favourable time to come out is at the top of high water, during the spring-tides. The vessel should have good canvass bent to withstand the frequent smart squalls that are common at this season, but more particularly at the full and change of the moon. A

dull-sailing ship would find it difficult to get an offing in one tide during the neaps, and would risk the necessity of bearing up for the harbour, or anchoring, at the great danger of losing it, from the heavy swell that is constantly rolling in at this season. The pilot generally quits the ship between the Prongs and Tull Reef, which forms the entrance to the harbour; and it is advisable to keep the entrance open, in case of not being able to obtain a sufficient offing before the flood-tide makes. This is done by working with the Lighthouse, or light on Old Woman's Island, from north half east to north-north-east half east, taking care, in stretching to the northward, not to bring the lighthouse to the eastward of north-east by north, but rather to the northward of that bearing, in order to avoid getting to the northward of the south-west Prong, the extremity of which is south by west half west, two miles and a quarter from the lighthouse. Having obtained the depth of twenty to twenty-two fathoms, this may be considered a good offing; and, if the wind permits to lie up south by west by compass, this course, in a ship of moderate size, will enable her to retain these soundings, and thereby ensure her safety in proceeding to the southward. Should the depth of water decrease to eighteen fathoms, it will be advisable to make a board to the northward and westward, and endeavour to get soundings from thirty-five to forty fathoms, which is a good depth to preserve. In the months of June and July the winds hang so much to the southward of west, as to prevent ships from standing to the south without tacking; but in August, when the wind is more favourable, they frequently sail from the mouth of

the harbour in that direction without making a board.

From Bombay to Gheria the coast runs south by east; from Gheria, which is a projecting part of the land, to Coulan, it lies south-south-east, and thence more easterly to Cape Comorin.

In June and July it is advisable not to get nearer to this coast than forty fathoms; from this depth to sixty fathoms is the edge of the bank, which may be considered the best track; but it is of no consequence although a ship should get out of soundings until she approaches the Laccadive Islands, which are avoided by edging away to the eastward as soon as she arrives in the parallel of 13° north, until she regains soundings. The chronometer in this, as in all other cases, if duly attended to, will be very useful in ascertaining the ship's position.

The ELICALPINE BANK is in latitude 11° 16′ north, and 74° 20′ east, having but six and seven fathoms water, over rocks in some places, on which a ship of large dimensions would be liable to strike in a heavy sea. It should therefore be carefully avoided by keeping to the eastward. It is distant from Mount Dilly twenty-seven leagues. Midway between this and the above bank are soundings from sixty-five to seventy fathoms, but a little farther out there is no ground.

The current on the coast of Malabar at this season sets to the southward, from fifteen to twenty miles a-day; and, as you proceed, the wind veers generally to the northward of west, enabling you to make rapid progress. When you come between the Laccadive Islands and the main, preserve your situation along the edge of the bank till abreast of

Calicut, where the soundings do not extend so far off the coast as they do more to the northward. The shore may now be fearlessly approached till you have thirty fathoms water; but it is advisable not to come under that depth, unless to touch at some place, which should be done with great caution, by anchoring considerably farther out during the south-west than in the north-east monsoon, being prepared at all times to put to sea on the appearance of threatening weather. Having sights for your chronometer, and having passed the Elicalpine Bank from south by east half east to south-south-east, as circumstances require, keep from six to twelve leagues from the coast in the early part of the south-west monsoon, until you are abreast of Cape Comorin; but in August, or in settled steady weather, it may be safely approached within four or five leagues.

From Cochin the coast takes a south-east direction; and from Cape Comorin to Point de Galle the bearing is south-east three-quarters east 198 miles. In passing between Cape Comorin and Point de Galle, an easterly current often prevails, which should, in shaping the course, be allowed for; and therefore from abreast of Cape Comorin do not steer a more easterly course than south-east, or even south-east a quarter south, till you arrive in the parallel of Point de Galle, unless, from observations or longitude by chronometer, your situation is accurately ascertained.

If bound to Malacca Strait, or other parts to the eastward, it is not necessary to pass close to the south end of Ceylon; but, when bound to the Coromandel Coast, it will be advisable to make Point

de Galle or Dondre Head, and, after rounding the Great and Little Basses, steer along the east side of the island, keeping within a moderate distance of the coast to Point Palmyra; then stretch over to the westward for Point Calymere, or the land about Negapatam.

We shall now describe the course from Ceylon through the Straits of Malacca in the south-west monsoon. From Dondre Head, Pulo Rondo bears east a little northerly 289 leagues. A ship being from seven to ten leagues south of Dondre Head, may steer east, varying her course half a point either way, as indicated by the latitude, so as to fall in with Pulo Rondo, leaving it to the southward, unless she intend to go into Acheen; in which case, upon approaching the land, she will endeavour to fall in with Acheen Head, or KING'S POINT, which is in latitude 5° 36′ north and longitude 95° 17′ east. This point forms the southern side of the SURAT PASSAGE, which is bounded on the north side by Pulo Gomez, Stony Island, and Pulo Conchin; the two latter islands being connected by a chain of rocks. King's Point is a high bluff headland, forming the north-west extremity of Sumatra. In approaching it from the south-west no opening is perceived; the contiguous islands, Gomez, Nancy, and Brasse, appearing to join the mainland, when seen from that quarter. To the southward of King's Point about five miles is a sandy bay on the south side of a low green point, which at a considerable distance may be mistaken for the Surat Passage, or a strait, the land there being low near the sea, and covered with trees. In this bay there is a rocky islet, and at its south point two rocks above water, on which the sea

breaks, with twelve and fourteen fathoms near them, and the bay is otherwise lined by a reef fronting the sea. From this situation King's Point appears like a steep hill; and Pulo Gomez then resembles two paps, its western point being very low, with an islet adjoining, and breakers projecting a considerable way to the westward. To avoid these, ships steering for the Surat Passage should keep nearest to King's Point, which is bold, with regular soundings of twelve and fourteen fathoms, sandy bottom, at a moderate distance from it, and they may anchor occasionally to stop tide near the shore, in seven, eight, or ten fathoms water. The south side of Pulo Gomez may also be safely approached; the depths are from twenty-four to fifteen fathoms, when its south point bears east from one to one mile and a half; eighteen fathoms with it east by north two miles; fourteen fathoms when east by north three-quarters of a mile; and thirteen fathoms when it is one mile east-north-east; and regular soundings, from twenty to thirty-five fathoms, extend about two leagues to the westward of it and King's Point.

The flood-tide sets directly through the Surat Passage to the north-east and the ebb in the opposite direction. A ship intending to follow this passage may, in the event of an adverse tide, anchor under King's Point until the flood makes. When weighing, she ought to keep nearest to that point, for the reasons before mentioned.

The narrow gateway or gut at the east end of the passage, formed between the eastern extremity of the point just mentioned and the opposite island, is only about eighty or ninety fathoms wide, with thirty and thirty-five fathoms, rocky bottom; and the tide sets

through it with great rapidity, five and six miles an hour on the springs. If the wind be contrary, a ship may back and fill through this narrow part, with her head toward the windward shore, keeping rather nearer to the point, which is perpendicular and steep-to, whereas the opposite shore is not so bold. A fatal instance, however, occurred to Captain Bean of the Harriet, who, in backing and filling through this passage, was carried along by the eddies, and wrecked on the rocks. Several large fleets, however, have passed through it in safety. From this strait the Castle Eden steered about east-north-east to the anchorage at Acheen, shoaling from twenty to ten fathoms, when she anchored with the river's mouth south-east a quarter east one mile and a half. In the Surat Passage, the time of high water at full and change is eight hours.

Acheen, in latitude 5° 35′ north, longitude 95° 26′ east, two leagues and a half from the eastern end of the Surat Passage, is a considerable town, situated on the banks of the river, which falls into the sea by several branches, separating the low country into islands; and this plain, formed between the foot of the mountains and the coast, is partly inundated during the rainy season. This was formerly a place of great trade, frequented by ships of different countries of Europe, as well as those from China and all parts of India. The kingdom of Acheen was then powerful and flourishing; but it is at present much reduced, many of the rajahs or chiefs, who formerly were tributary to the king, being now independent. Gold, camphor, pepper, sulphur, betel-nut, and similar commodities, used to be exported, and there is still some trade carried on by small vessels from different

parts of India; but large ships seldom touch here, unless to procure refreshments. Rice, bullocks, poultry, vegetables, and fruits, may be generally got in abundance, and also fresh water. The principal entrance of the river has a shoal bar, which a boat can hardly cross at low water; but vessels from twenty to thirty tons burden may enter the river at high water, when the rise on the springs is about seven feet. The time of high water at full and change is nine hours, subject to irregularities from winds or other causes.

The common ANCHORAGE in the roads is in eight or nine fathoms, in latitude 5° 38′ north, about two or three miles off the entrance of the river, bearing south half east to south-east. Here vessels are well sheltered from the south-west monsoon, which generally prevails from April to November. In the other season the easterly winds are seldom strong, but those from the north-west, which happen occasionally, blow into the Bengal Passage with great force, and require good ground-tackle to ride secure against them. In the road, and near the shore, land and sea breezes are often experienced in both seasons; but the land-winds are very partial, seldom extending beyond the islands. The king resides generally at Toulosamaway; and Acheen, being seldom visited by him, has in consequence been little frequented lately by merchant vessels. The chief places of trade to the eastward of that city are Pedir, Bourou, and Toulosamaway. Ships resorting hither ought to be on their guard, and not put too much confidence in the people, nor suffer them to be much in their debt. When this has been the case, many have been cut off, as the easier manner of settling their accounts.

During the last thirty years the king has been at war with some one or other of his subjects; and his fleet, consisting of twelve or fourteen snows and brigs, has usually cruised from Toulosamaway round to Soosoo, on the west coast of Sumatra.

Malacca Passage is formed between Pulo Way and the Sumatra coast, and is about three leagues broad, containing the small island Malora, or Pulo Buroo, nearly one-third channel over from the latter shore. The passage on either side of this island is safe, but that on its south side is preferable, having soundings from sixteen fathoms near it, to nine or ten fathoms near Sumatra; whereas between Pulo Way and Malora the water is deep, and no good anchorage can be obtained. In working during the night through this passage, which is only about one mile and a half wide, it is advisable to keep the lead going quick, standing to ten fathoms, and not under this depth, towards Point Pedro. The water deepens rapidly from twelve to seventeen fathoms in standing towards Malora, then from twelve to eight fathoms within half a mile of that point, which ought not to be approached nearer, as a reef projects from the east side of it fully a quarter of a mile. This is the best passage to approach Acheen, in coming from the north-east or east.

Bengal Passage is formed between Pulo Brasse and Pulo Way. It is about four leagues wide, and very convenient for ships sailing from Acheen northward, as the current generally sets out in that direction, and to the north-west and west in the south-west monsoon, which makes this passage desirable for ships bound to the westward. It sometimes runs from twenty-five to forty miles in twenty-four hours.

This passage is seldom adopted by ships going into Acheen from the westward, as it affords no anchorage except near Pulo Brasse; the Surat Passage is therefore to be preferred.

Pulo Rondo, the northernmost of the group of islands at the north-west end of Sumatra, is a bold, perpendicular, barren rock, in latitude 6° 4′ 30″ north, longitude 95° 14′ east. It bears south-east by east half east from the south end of the Great Nicobar, distant twenty-eight leagues. These two islands bound the great entrance leading to Malacca Strait from the westward.

Pulo Way, the largest of this group, is about four leagues to the south-east of Pulo Rondo, extending about three leagues in that direction. Being high and uneven, it may be seen twelve leagues. There are soundings along the south side, and in some parts near the shore.

Pulo Brasse, nearly seven leagues south-south-west from Pulo Rondo, fronts the sea to the north-west, is very high, and of an even aspect. Its north end is in latitude 5° 47′ north, longitude 95° 6′ east, off which point about three miles there are four rocky islets, the largest of them being about twenty-five feet above water, with regular soundings near it from twenty-five to twenty-eight fathoms, mud, from one to two miles to the eastward and northward; but a reef projects from the north end of Pulo Brasse towards the other islets, the outermost of which is bold when approached on the east, north, and west sides, and there is a safe passage between it and the next one; but a reef surrounds the latter to the distance of a cable's length, upon which the sea breaks high even in moderate breezes. Along the eastern side of Pulo

Brasse there are from twenty to twenty-five fathoms, sandy bottom, at a moderate distance from the shore, where ships may occasionally anchor; and with the outer islet bearing south three quarters west two miles, there are twenty-three fathoms.

Pulo Nancy nearly joins the south-east point of Pulo Brasse; but between them, on the west side, there is Middle Island, of considerable size, with some islets or rocks near it on the south side. Very near the west point of Pulo Nancy there is a reef of rocks bounding the west end of the Cedar Passage on the north side, having ten and twelve fathoms close to it outside, and fourteen fathoms between it and the point of Pulo Nancy, although it lies near the latter.

The Cedar or Sedre Passage is formed between Pulo Nancy to the northward, and Stony Island and Pulo Gomez to the southward. It is little frequented, although wider than the Surat Passage, and safer than is generally supposed, having soundings from seventeen to twenty fathoms in mid-channel. The only dangers are at the west entrance, where rocks project from Pulo Gomez to the westward, on which the sea breaks high in bad weather, and the rocks on the north side, close to the north point of Pulo Nancy already mentioned. There is also a reef that projects from the west end of Stony Island to the north-westward, a considerable way into the channel.

If a ship proceed through this passage it will be prudent to keep a boat ahead sounding occasionally.

On the south side of Pulo Nancy, about a full mile inside of the west point, is good anchorage, having six or seven fathoms, in a small bay, on the west

side of which fresh water may be procured, and plenty of firewood. The narrowest part of the passage is between the reef projecting from the west end of Stony Island and the shore of Pulo Nancy, and there it is about a mile broad. Between that reef and the north-west end of Pulo Gomez there are fourteen and sixteen fathoms in a channel of communication from Cedar Passage into that of Surat. Stony Island and Pulo Conchin are steep-to on the north sides, with from eleven to fourteen fathoms close to them. From the east point of Pulo Nancy rocks project a little way; and close to them there are fifteen fathoms water.

Between Acheen Head and the Nicobar Islands the SOUTH-WEST MONSOON generally begins about the end of April, or rather early in May, and abates in October, although in that month, and also in November, westerly winds frequently prevail. During the strength of this monsoon, from May to September, the weather is often cloudy, with squalls and heavy showers of rain at times; the current then generally sets with the wind to the eastward into Malacca Strait, but more commonly to north-east. It is, however, liable to change, setting to the southward at times, particularly if the wind be light and veers to the westward. When the current in the south-west monsoon runs in between the South Nicobar and the islands off Acheen to the north-eastward, there is generally a contrary or eddy current setting along the coast of Pedir to the westward, which continues in that direction, and running amongst the Acheen Islands to seaward. Hence all ships bound from Malacca westward should in this season keep near the coast of Pedir,

and after reaching Acheen they may go out by the Surat Passage, if the weather be favourable, or with more advantage through the Bengal Passage, observing to keep close round the islets off the north end of Pulo Brasse; then taking every opportunity to tack with the shifting winds that are favourable for getting to the south-westward. The King George and the Worcester, East Indiamen, with several other ships, unsuccessfully attempted to beat out between Pulo Rondo and the Nicobars during the south-west monsoon, whereas, had they kept the Sumatra shore on board, and adopted the Surat or Bengal Passages, they would in all probability have accomplished their object without any difficulty.

The NORTH-EAST MONSOON prevails between Acheen Head and the Nicobars from November to May, which is the fair-weather season. In October and November the winds are variable, frequently at north-west and west; although in some seasons the north-east winds set in regularly in the latter month. From this period to March, the north-east monsoon is strongest; but at times it is liable to veer to the northward and north-west, and westerly breezes of one or two days' duration have been experienced during the whole period that the north-east monsoon should prevail.

Late in March, or early in April, the north-east and northerly winds become light and variable. When the north-east monsoon blows steady, the current generally runs with the wind, out of the strait to the westward. When the wind draws to the northward, the current a little outside of the Acheen Islands sets to the southward between them and the Nicobars; and when the wind veers to west

or south-west, it generally runs into the strait or to the north-eastward; so that the current there is in its direction and velocity *mostly* governed by the wind.

This is however not always the case; for at times the current is found to run oblique, or contrary to the wind, when the navigator must be cautious, in the absence of astronomical observations to show the latitude, more particularly when running for the entrance of the strait during hazy weather in the south-west monsoon. During the months of October and November, several ships, in attempting to work out between Pulo Rondo and the Nicobars, have been obliged to bear up or stand to the northward before they could get to the westward. Had they taken advantage of the current on the coast of Pedir, and adopted the Surat Passage, they would in all probability have succeeded in their attempt.

In the entrance of the Straits of Malacca, and indeed in many other situations in the Indian navigation, very strong RIPPLINGS are experienced, and are alarming to strangers, from the great noise which accompanies them, without any apparent cause, and frequently in the absence of any current. These ripplings are so great as to endanger the safety of a small boat. The author having occasion to row guard during the night in the mouth of the Bay of Amboyna, encountered one of these, which broke so high and irregularly, that the water came into the boat on all sides and nearly filled her, though she was a large Deal-built eight-oared cutter. The sea, previously to the commencement of this ripple, had been perfectly calm, and there was little or no wind at the time.

From PULO RONDO to PRINCE OF WALES' ISLAND, or PULO PENANG of the Malays. Ships being off Pulo Rondo, and bound to Penang, will find it advisable to pass well to the northward of Pulo Perah; for although this island lies directly in the track to Penang, it is notorious for frequent calms in its vicinity. Its latitude is 5° 42′ north, and longitude 99° 1′ east. When approaching the Malay shore and the islands lying off it, every opportunity should be embraced to obtain the latitude by the meridional altitude of stars in the evening or morning twilight; for the navigator will frequently be disappointed in the noon observation, by means of clouds which obscure the sun at that time. Having obtained the latitude, he will, however inexperienced, be enabled, upon making the land, to know his situation. The Laddas are high, rugged, bold, peaked islands, their south end being in latitude 6° 8′ north. They are usually the point to steer for in crossing over from Pulo Rondo, and having made and approached them, Penang will be seen in the south-east; the latitude of its north end being 5° 30′ north. Continue your course to the south-eastward, leaving the Laddas two or three leagues on the larboard hand, and the small islands called the Peers at the same distance, by which time you will see the Boonting Islands ahead: these are four in number, moderately high, and lying close in with the Queda shore. You will now be under the influence of the land and sea breezes,—the latter setting in about noon; by its means you will be able to sail into the harbour, which will appear open to the southward of you. By adopting this route, there will be less fear of being becalmed than there would

be in passing near Pulo Perah, and shaping a course for the north end of Penang, the distance from Pulo Perah to Penang being one-third more than from Pulo Perah to the Laddas, which, being so contiguous to the coast, are in the limits of the land and sea breezes. The author once experienced the advantage now mentioned. Being with a fleet bound to Penang, the ship in which he was had borrowed upon the Laddas, and was about five miles north-east from the body of the fleet, when the commodore, seeing the advantage we had, made our signal to proceed, and we anchored thirty hours before the other vessels.

Pulo Penang, which signifies Betel-nut Island, extends from latitude 5° 16′ to 5° 30′ north; its centre is east 13° south, twenty-five leagues from Pulo Perah, and the soundings decrease regularly from forty-five or fifty fathoms near the latter to twenty-five fathoms within five or six leagues of the former. It is a high, regular, oblong island, covered with trees to the waterside, and may be seen in clear weather twenty leagues. Off its south-west point are two small islets, the northernmost having from five to seven fathoms near it; and opposite this, on the coast of Penang, water may be procured. The north-west end of this last is high and uneven, and when seen from the westward at a great distance, the extreme north point has the appearance of an island detached from it, joining as you approach. It was presented by the King of Queda to Captain Francis Light, and taken possession of by him in 1786. This gentleman married the king's daughter, and was justly held in great esteem, not only by the Malays, but by every person who knew him. Upon

condition of being made governor, he gave it up to the East India Company, who also obtained a grant of a considerable tract of land on the main, fronting the island, which is all low near the sea, except a small hill in the interior, contiguous to Praya River.

Fort Cornwallis is built on the east side of the island, close to the town, which is called George Town by Europeans. From the first settlement of the British, the population increased with astonishing rapidity; in a very few years after, there were from four to five thousand inhabitants, and at the present time, near ten times that number, chiefly Chinese, Malays, and various tribes from India, Java, and other parts of the East. The principal articles of trade are betel-nut, pepper, rattans, tin, and some gold, brought here by the Malay proas; for which they receive in exchange opium, piece-goods, cutlery, arrack, dollars, and similar merchandise. Water and firewood may be procured here at a moderate rate; and poultry and bullocks are brought from the coast of Queda, which fluctuate in price according to the number of ships requiring them. Since the establishment of Sincapore, this island must have suffered a considerable decrease in its commerce,—that of Junkseylon, Queda, Salangore, and other Malay ports, centring also at Sincapore. Captain Horsburgh makes the latitude of the flag-staff, by good observation, 5° 24′ 30″ north, and longitude 100° 21′ 30″ east.

The following are directions how *to sail into Penang from the northward*:—Having a westerly wind, steer for the north end of the island, which is bold and safe to approach; if the wind be at north-east, borrow towards the small islands off the coast,

as before directed. The southernmost of the four Boonting Islands is called Bidan; its latitude is 5° 45′ north; and, being brought to bear about north by west, is a good mark to proceed by towards the harbour. The northernmost, which is the largest, lies opposite to the high land of Queda, having only two and a half fathoms between it and the main; and in the night it had better not be approached in a large ship under fourteen fathoms, but at any distance you please in the daytime. Being outside these islands, a south-south-east course will carry a ship about mid-channel, between the north end of Penang and the main. An extensive flat or bar stretches across this entrance, having only four fathoms at low-water spring-tides, principally mud, and regular soundings, which deepen as you approach the harbour. The north-east point of the island is about four miles to the north-west of Fort Point, having, at a small distance outside of it, and connected by shoal-water within it, the rocky islet Pulo Tecoos; when abreast of this, the water deepens gradually towards the harbour. Between Pulo Tecoos and Fort Point is a deep bay, containing a shoal mud-flat, steep, from five to four, then three and two fathoms, which must be guarded against.

As the soundings between the north end of Penang and the main are nearly equal from side to side, the navigator, in the night, should attend particularly to the appearance of the land, to enable him to keep in a proper track. The main, being low and covered with trees, will not be so conspicuous as the high land of the island; consequently the latter will generally appear nearest, when you are in mid-channel between them.

The rocks that project a little without Pulo Tecoos are steep-to, and may be approached to five or five and a half fathoms, at low water; and in five and a half to six fathoms will be proper depths to tack from the edge of the mud-bank between it and Fort Point. In standing towards the main, tack when the depths decrease a little under those amid-channel; abreast of the fort, and two or three miles to the northward of it, about seven fathoms is a good depth to tack in, from the Queda shore.

In the night do not run amongst the shipping, unless well acquainted, but rather anchor abreast of Pulo Tecoos, or between it and Fort Point, until daylight.

Departing from Penang Harbour. Large ships generally go out by the North Channel, even when bound to the southward. But if a good pilot can be obtained, the adoption of the South Channel will make a saving of one or two days to ships proceeding through the Straits of Malacca.

From Penang to the Arroas and Parcelar Hill. From the south-west end of Prince of Wales Island, Pulo Dinding bears south-south-east about twenty leagues; and the coast between them, which is mostly low and woody near the sea, forms a bight; but high mountains appear inland, in the kingdom of Perah. There are also some hills near the sea, to the northward of Pulo Dinding, which greatly resemble that island in coming from the northward, and have therefore been called False Dinding. The whole coast of Perah is lined by a shoal mud-bank, extending out from two to three and a half leagues. The depth decreases suddenly on the edge of it, when under fifteen fathoms; but you may

occasionally stand into nine or ten fathoms in working, keeping the lead going briskly. It would be imprudent to borrow under these depths, particularly in the night. Two of the East India Company's ships, on September 29, 1799, grounded on this bank, with the south end of Penang north-north-west, and Saddle Island north-north-west half west, off the Malay shore seven miles. The crews were employed until the 4th of October in getting afloat, which they did by running out their stream and kedge anchors, and heaving the ships through the mud at high water. If abreast the north-west end of Penang, steer along the coast in sixteen to thirty fathoms; in working, you may approach the island to ten or twelve fathoms; and the edge of the mud-flat that fronts the Malay coast between it and Pulo Dinding may be approached to the same depths in the daytime. By keeping in with the coast, the westerly current usually prevailing in the offing will be partly avoided,—the convenience of anchoring occasionally when required will be afforded,—and the chance of better winds will be an additional reason for keeping the shore on board, as near as the soundings before mentioned will permit. The course in a fair wind, from off the south-west end of Penang to Pulo Dinding, is south by east by compass; and when off the latter island do not approach it under nine fathoms, as there is a shoal to the north of Great Dinding, just within that depth. The latitude of Pulo Dinding is 4° 16′ north. It is high and woody, situated near the main, —a hill appearing at each end when first seen. On its south-west side, close to it, lies Little Pulo Dinding, with two islets at its south-west end; to the

west-south-west of which, about four miles, there is a spit or bank of mud, probably not dangerous; but the water shoals suddenly from fourteen to six fathoms upon it; and as there may be less, it is best to avoid it.

At the east end of Great Dinding there is fresh water, near the ruins of a fort where the Dutch formerly had a settlement. If you wish to procure it, pass between Little Dinding and the northernmost of the Sambelangs, where the depths are mostly from twenty to twenty-six fathoms. There is a rock above water, nearly midway between Great Dinding and the Sambelangs, having a safe channel on either side; and it is best avoided by attending to the tide, and steering along the bold south shore of Dinding to the east point, close to which you may anchor in eight or ten fathoms, or to the southward of it, as seems most convenient.

SAMBELANGS, signifying Nine Islands in the Malay language, are situated to the southward of Pulo Dinding, and extend seven or eight miles in a north-east direction. They are mostly small, high, and bluff, covered with trees, and visible about seven leagues. The most southern, which is also the outermost, is in latitude 4° 3′ north, longitude 100° 35′ east, bearing east 5° north seven leagues from Pulo Jarra. To the north-west of it, about a mile and a half, is a rock speckled black and white, which appears all white when the sun shines upon it; and about a mile north-north-west of it is a black one a little above water. These rocks should not be approached in the night, being steep-to; for the soundings near them, and one or two miles to the westward, are generally from

twenty-three to twenty-six fathoms; and the same depths nearly are found amongst and near the Sambelangs. Between the main and these last there is a safe channel, with from fifteen to twenty-three fathoms; and between the islands themselves there are some safe but narrow passages.

Pulo Jarra, in latitude 4° 0′ north, longitude 100° 12′ east, is twenty-seven leagues south 2° west from Penang, and may be seen seven leagues. It is steep-to, having from thirty-three to thirty-six fathoms very near it in every direction, and the same depths between it and Pulo Varela. Mid-channel between it and the Sambelangs there are generally from thirty to thirty-two fathoms, decreasing to twenty-five near the latter islands.

The Round Arroa, in latitude 2° 49′ north, longitude 100° 40′ east, twenty-four leagues, south 4° east from the South Sambelang, is a high rock with some trees, visible six leagues, having several small rocks near it, two of which may be seen four leagues off,—one of them to the northward, and the other to the southward, with straggling rocks about them. About a mile and a half south-south-west from the Round Arroa, there is a rock above water, called the South Rock. The Round Arroa is the principal mark for leading a ship between the sands towards Parcelar Hill.

The Long Arroa, in latitude 2° 52′ 30″ north, is six miles north-west quarter west of the Round Arroa; it consists of two islands, nearly a mile in length, and covered with trees; is of a flat appearance, and not so high as the Round Arroa. Water may be procured on the east side of the southernmost of the two islands, in a cove where there is a fine sandy

beach. Captain Ross observes, that a ship may lie near enough to cover the watering-place with her guns, which may be necessary, in case of any hostility on the part of the Malay fishermen, who occasionally frequent these islands. There is ten fathoms close to the sandy beach; but the small islets which front the Arroa are mostly united by reefs of sharp-pointed rocks, few of which are visible at high water, or at the distance that ships usually pass. The rise and fall of the tide here have been observed to be about ten feet. About four miles and a half north-east by north from the Round Arroa, and nearly east six miles and a half from the Long Arroa, is EAST ROCK, flat and black, but little above the surface at high water. One mile and a half west of this, is a SUNKEN ROCK, covered at half-flood, on which the sea breaks occasionally. The soundings between the East Rock and the Sunken Rock are from eleven to seventeen fathoms. Nearly two miles west from the latter rock, and three miles and a quarter to the eastward of the Long Arroa, is HIGH ROCK. This is fronted by smaller rocks to the north-west and south-west. There are, however, regular soundings of nine fathoms between High Rock and the Sunken Rock east of it; between it and the Long Arroa the depths are from seven to ten fathoms in a channel two miles and a half wide. About two miles and three quarters north-eastward of the Long Arroa is NORTH ROCK, considerably above water, having eight and nine fathoms, mud, very near the smaller rocks that front it; and within a mile of the north and north-west sides of the Long Arroa the depths are regular, from nine to eleven or twelve fathoms. To the west and south-west of

the Long Arroa about a mile, are several bare islets chained together by rocks. Captain Ross, who surveyed them in 1819, calls them the Western Arroas. This gentleman observes, that if a ship be working near the Arroas against a heavy north-west swell she will find shelter from north-west or west winds by anchoring under the Long Arroa, taking care of a reef that projects about half a mile from its north end to the north-north-east.

In approaching the Arroas from the north, care should be taken to avoid being set to the westward of them; for although ships have passed them in safety on that side, they have been obliged to haul to the eastward, through an unfrequented track, into the proper channel, passing to the southward of them.

When about midway between the Sambelangs and Pulo Jarra, a south-south-east course will carry a ship to the north-west point of the North Sand. In this and all other situations the chronometer will be found very useful in detecting the prevailing current. As you approach the sand, keep the lead going. The soundings, from twenty-eight to twenty-six fathoms, decrease quickly to ten, nine, and eight fathoms upon the north-west point of the sand, which is north-east by north, eight or nine leagues from the Long Arroa. There appears to be no danger on this part of the sand, and therefore, in working, it may be advisable to keep near to its edge, in case of calm or adverse currents, the depths being moderate on the sand, and convenient for anchoring; whereas between it and the Arroas the soundings in some places are from forty to forty-six fathoms.

Seven miles north-east of the Round Arroa, and

three or four miles from the East Rock, there is a small shoal, having from five to eight fathoms upon it. Ships proceeding to the southward should endeavour to make the Arroas, bearing from south-west by south to south-south-west, and continue them on that bearing until within about three or four leagues of them, which is the nearest distance that they need be approached; then, hauling to the eastward, bring the Round Arroa to bear west half south, and sink it from the deck on that bearing. By this time Parcelar Hill will be seen, and should be brought to bear east; draw it to east half north gradually, and here a ship will often have occasion to steer three or four points either way, according as the tide is affecting her, in order to keep the bearing of the hill proper, which should be carefully watched by the azimuth compass, in order to avoid the Two-and-a-half-fathoms Bank, which should not be approached under ten fathoms in passing to the southward of it. When the low land about Pulo Callam appears at an elevation of sixteen feet above the sea, you are abreast of the Two-and-a-half-fathoms Bank, from which Parcelar Hill bears east 4° half south. This bank, consisting of rocky bottom and hard sand, having a spit extending from its south side, on which the water shoals suddenly from ten to eight, six, four, and two and a half fathoms, is in latitude 2°53′ north, and longitude 101° 0′ east, and is five leagues west from the entrance of Callam Strait. It is avoided by taking care not to bring Parcelar Hill southward of east, when passing to the southward of the bank. But several ships have sailed to the northward of it, and in that case the hill, from east by south to east by south half south, will be a proper mark to lead the na-

vigator between the Two-and-a-half-fathoms Bank and the Blenheim's Shoal, which bears north by west three leagues from it. In working through this passage with a contrary wind, Mr Horsburgh directs that the hill be kept between east three-quarters south and east by south three-quarters south, to avoid the Two-and-a-half-fathoms Bank on one side, and the Blenheim's Shoal on the other. This latter shoal is eight and a half or nine leagues west 23° north from Parcelar Hill. It extends east-north-east and west-south-west a mile and three-quarters, having only six or seven feet at low water *neap* tides upon it; its latitude 3° 3¼′ north.

Besides the above shoals, Captain D. Ross, in 1819, discovered several other dangers upon what has usually been called the North Sand. The following, being nearest to the north-west and western parts, are consequently most in the way of ships which may chance to borrow too far in upon the sand, viz.:—

1. Small bank of four and three quarter fathoms, in latitude 3° 13½′ north, longitude 100° 52′ east, and is four miles south-east of the north-west extremity of the sands.

2. Sandy Ridge, with from two to four fathoms, extending three miles south-east and north-west, or from latitude 3° 10′ to 3° 12′ north, its north-west end being about three miles east-south-east from the above small bank, and its south-east end bearing north, a little westerly, six or seven miles from the Blenheim's Shoal.

3. Spit of rocks and sand, with only a few feet water, its north-west end in latitude 3° 9′ north, and about two miles south-east from Sandy Ridge,

extending three miles south-easterly. This end is about north-east four miles from the Blenheim's Shoal.

4. Round small bank, of two and a half fathoms, in latitude 3° 4′ 30″ north, midway and in a direct line between the south end of the above spit and the Blenheim's Shoal, being distant from each about two miles.

5. Patch of four and three-quarter fathoms, in latitude 3° 4′ north, about three miles west by north from the Blenheim's Shoal, and near the western part of the sand.

6. Bank of four and a half fathoms, in latitude 2° 59′ north, about a mile and a half in extent, bearing south a quarter east from the Blenheim's Shoal four miles, and north by west a quarter west from the Two-and-a-half-fathoms Bank, distance six miles.

South Sand, four and a half leagues east 1° south from the Round Arroa, is a hard sand, on which the Gunjavar had four and a half fathoms least water; and about one league farther, in the same direction, is another hard bank of five fathoms, having twelve fathoms all round it within a cable's length, and from which Parcelar Hill bears east half north. This bank is alarming to strangers; but the least water hitherto found upon it was not less than five fathoms at low-water spring-tides; and, with due regard to the bearing of the hill or the Round Arroa, it may always be distinguished from the Two-and-a-half-fathoms Bank, which is five miles and a half north-north-east three-quarters east of it. Another shoal patch of from six to eight fathoms is situated east by south half south, about three miles from the easternmost of the two

banks described in this paragraph. These banks may all be avoided, by not bringing the Round Arroa to the westward of west half south whilst it can be discerned from the poop of a large ship, or by keeping Parcelar Hill to the eastward of east 5° north in passing them.

There are several other shoal patches, on what is called the South Sand, which lie in a south-east and north-west direction, and form the starboard side of the channel between the Malay coast and the South Sand, in proceeding to the south-eastward. The one most in the way of ships, and having only one fathom and a half upon it at low water, is twenty miles south by east from Parcelar Hill, west half north from Cape Rachado, and twelve miles due south from Parcelar Point.

Another shoal patch lies south-west a quarter south, fifteen miles from Parcelar Hill. The best way to avoid these shoals in the daytime is not to get farther off the Malay shore than from two to four leagues, and in the night not to go without twenty-five fathoms from the coast after passing Parcelar Point; for soundings from thirty to thirty-five fathoms are obtained close to the shoal patches on the South Sand.

Parcelar Hill, in latitude 2° 51′ north, longitude 101°25′30″ east, is forty-eight miles east 4° north from the Round Arroa. It is of an oblong form, having its summit a little west of its centre, and apparently sloping at each end, when seen from the westward; but when viewed from the south it shows a pyramidal form of small elevation near the sea, and has a darker shade than the other hills, which are farther inland. From the north-west extremity of the North Sand, its summit is just discernible from

the poop or mizzen-rigging of a large ship, bearing from east by south to east-south-east.

From PARCELAR to RACHADO and MALACCA. Being about two leagues off the land of Parcelar, a south-east by east course will carry a ship close to Cape Rachado, which is a bold projecting point of moderate height. The soundings in this passage are irregular, from thirteen fathoms on what is called the Channel Bank, which fronts the land of Parcelar, to twenty-one fathoms inside, and twenty-six outside of it. This Channel Bank is narrow, and lies in the fair-way, parallel to the coast, at the distance of about five miles, terminating south-south-west of Parcelar Point. Between it and another, which has only eleven fathoms on it, there are soundings from thirty to seventeen and eleven fathoms. These latter depths are obtained when Parcelar Point is eight miles north-west a quarter north. From this (Eleven Fathoms) bank the soundings to Cape Rachado are pretty regular from twenty to seventeen fathoms. Between Parcelar Point and Cape Rachado is the Bambek Shoal. A line drawn from these two points just includes this shoal on the coast-side of the line, and therefore in the daytime do not come within it. In the night, so long as you can see either of the above points, do not bring Parcelar Point to the *westward* of north-west three-quarters west, or Cape Rachado to the *southward* of south-east by east, until you are about midway between them, when you will have passed the Bambek Shoal, and may borrow, *if necessary*, upon the Malay side.

CAPE RACHADO, in latitude 2° 26′ north, longitude 101° 51′ east, bears from Parcelar Point (which

is in latitude 2° 42′ north) south-east by east twenty-seven miles. It is a bluff headland covered with trees, and visible seven leagues, and can just be seen from the poop of a large ship, when she is a little to the southward of the above-mentioned point. At first it appears like an island, the neck of the land being lower than the cape itself. There is an islet close to the cape, near which there are from twenty-four to twenty-eight fathoms; and about three or four miles off it (which is a proper distance to keep) the soundings are from fifteen to twenty-two fathoms, irregular. From this situation the land on the opposite side of the strait may be seen from the deck, this being the narrowest part of the strait, which at this point is supposed to be free from danger; but it is always preferable to keep on the Malay side of the channel.

From Cape Rachado to the outermost of the Water Islands, the course is south-east half east twelve leagues; the same course will carry a ship into Malacca Roads, where those intending to anchor should not go under fifteen fathoms in passing Fisher's Island, nor come nearer to it than a mile in a large ship, there being a shoal-patch, having eighteen feet at low-water spring-tides, which lies half a mile south 15° east from the body of that Island. It is low and level, and between it and the main there is foul ground, and no safe passage. In approaching Malacca Roads from the south, particularly in the night, be cautious of Panjang Reef, which projects about two miles from the shore, and extends to Red Island, near Malacca. The soundings near the reef afford little or no guide in the night, there being from seventeen to nineteen

fathoms close to the rocks. Keeping the *outer* Water Island nothing to the southward of south-east, will give a good birth to the Panjang Reef either by night or day.

MALACCA CHURCH, on the hill, is in latitude 2° 12′ north, longitude 102° 15′ east. The LIGHT-HOUSE is 146 feet above the level of the sea, and bears from the anchorage in the roads north 48° east to north 64° east, from the body of the outer Water Island north 29° west, and from the outer extremity of Fisher's Island east 16° south.

The ANCHORAGE in the ROADS for large ships is in ten fathoms, with the church north-east by east, Fisher's Island north-west half west, off the town from one and a half to two miles. Small ships may anchor nearer, in from seven to four fathoms, there being no danger to be apprehended abreast of the town, which is fronted by a mud-bank; but do not anchor on the east side of the road near Red Island, where the bottom is foul, with irregular rocky ground decreasing suddenly from eight to three fathoms on the northern extremity of the Panjang Reef.

During the south-west monsoon, sudden squalls from the Sumatra side frequently blow into the roads at night, accompanied with thunder and lightning. These should be guarded against, as many vessels have suffered considerable damage from them, which might possibly have been prevented by having lightning-conductors properly fitted and attended to. Before these squalls commence, or rather as soon as the ship tends to them, it will be advisable to give a good scope of cable. Should she be under way during their occurrence, they may be turned to considerable

advantage, by making her snug before they commence, when many miles may be run and much time saved by their action. Indeed, night is the best time to proceed, when the land can be distinctly seen, as the winds are then generally fresher, and if due care be taken as to the lead and the bearing of the land, little danger need be apprehended in this and many other parts of the straits. Being off the outer Water Island, the course to Tanjong Boulus is south-east three-quarters east thirty leagues; this course will carry a ship at a proper distance from the dangers on the Malay shore, none of which extend more than four miles from the coast. The first is a shoal at exactly the above distance, having only two fathoms water, and consisting of black sand. Mount Formosa hence bears north-east by east, and Mount Moar north-north-west three-quarters west. To avoid it, do not bring the latter mount to the westward of north-north-west, until Mount Formosa is north-east half east, when you will be to the southward of the shoal.

Mount Formosa is in latitude 1° 49′ north, longitude 102° 55′ east; between this and Pulo Pisang, and also between Pisang and Pulo Cocob, the shore is low (excepting Mount Battou Ballow, which lies about half-way between Pulo Pisang and Formosa), and it is lined with a mud-bank, which extends as far as four miles and a half from the coast; that is, when to the northward of Pulo Pisang, which is avoided by keeping the western end of this island nothing to the southward of south-east by east; this bearing being only half a mile outside of a projecting part of the bank, on which there is from five to four and three fathoms, and distant from Pulo Pi-

sang five miles. There are two small round islets lying off the west end of Pisang, on the largest of which fresh water may sometimes be procured; also two others on its eastern side.

PULO PISANG is in latitude 1° 28′ north, longitude 103° 14′ east, of moderate height, covered with wood, and composed of three hummocks, the middle one being of a round form, and the most elevated. It may be seen eight or nine leagues. The soundings between Formosa and Pisang, in the fair-way, vary from fifteen to twenty-one fathoms. There are two extensive banks running parallel to the coast, between Mount Battou Ballow and Tanjong Bullam; the innermost is about two or three miles from the mud-flat that lines the coast, and the other from seven to five miles outside the first. The least water on the inner one is seven fathoms, and on the outer one five fathoms, except near to its north-west end, where there is only three and a half fathoms, with Mount Formosa bearing north by east half east, distant fourteen miles. Therefore, by keeping from two and a half to four leagues from the coast, a ship will be secure from the above danger. From the west extreme of Pisang, Mount Formosa bears north 44° west; the centre of Little Pisang west 8° north; the peak of the Great Carrimon south 19° east, and the other peak south 27° half east.

After passing Pulo Pisang to the south-east, the mud-flat does not extend so far off shore; in a large ship, however, it will be better not to shoal the water under twelve fathoms, or to bring the outermost islet off Pisang to the westward of north-west, until four or five miles past Pisang. Abreast of

Pulo Cocob, which is twelve miles from Pisang, there is deep water within a mile and a half of the island; it is about three miles in extent, covered with wood, and so near the coast, that it appears as if connected with it. The trees on its north-west end are of a bright-green colour, low, resembling grass; such as grow on its south end are tall poon-trees like those on the coast, from which it is perceived to be separated by a narrow strait, when the bluff south-east point of Pulo Cocob that forms the entrance of the strait is bearing north 16° west. In the night, it will be advisable to keep in from seventeen to nineteen fathoms, between Pulo Pisang and the Carrimons; and in working, not to shoal the water under thirteen fathoms, either on the Malay side or on the middle bank that forms the fair-way channel.

The north end of the Little Carrimon is in latitude 1° 8′ 30″ north, bearing from the highest part of Pulo Pisang south 25° east about seven leagues; it is a high bold island, about two and a half miles in extent, having a peak in the centre covered with trees.

The Brothers are three small islets well wooded, and lying to the north-west of the Little Carrimon; the nearest about a mile, and the two others about three miles from that island. The north and east sides are bold to approach, with soundings from eighteen to twenty-two near them, and seventeen to eighteen between the Little Carrimon and Pulo Cocob; these islands bear of each other south 15° west and north 15° east, distance three or four leagues.

The Great Carrimon is separated from the south-west side of the Little Carrimon by a narrow

passage; it extends about ten miles in a south-south-east direction, having near its north end two high peaks, and from the base of these it consists of low level land, stretching towards the Straits of Durian, and nearly joining the northern extremity of the island of Sabon. Off the north-west end of the Great Carrimon, at the distance of a mile and a half, there is a rock above water, and on its west side are several low islands. Its eastern side is fronted by a shoal mud-bank, projecting a mile and a half off, except at its north-east point, where there is from six to eight fathoms about a mile from the islet that lies in the passage between it and the Little Carrimon.

Tanjong Boulus, in latitude 1° 15′ north, and four miles south-eastward of Pulo Cocob, is the southernmost extreme of the Malay Peninsula, and also of the continent of Asia. It is a broad semi-circular point of low land, having high trees on its western side, and low bright-green mangroves to the eastward. Six leagues northward of this point inland is an isolated mount, called by the Malays Goonong Poolai, or Pontiana: all the adjacent country is low. The mud-bank, which extends from Pulo Cocob around Tonjong Boulus, is steep-to on the outer edge, and projects from one to one and a half mile from the shore. From Tanjong Boulus the coast takes a north-east direction towards the old Straits of Sincapore.

From abreast of Tanjong Boulus, at three or four miles' distance, and bound to the Straits of Sincapore, the course is east-south-east, having due regard to the tides, which are very irregular here. Continue this course until the two northernmost of

the Brothers are west of you, then steer east half south, taking care not to bring the north end of the Little Carrimon more to the westward than west a quarter south, until you have passed Tree Island Bank, the north end of which being east a little south of the north end of the Little Carrimon; or, if the latter is obscured by clouds, and Barn Island can be seen, keep its south end east by south, or the south end of Alligator Island east; and in working do not bring the south end of Barn Island more southerly than east-south-east half south, or more easterly than east quarter south; that is, in passing between Tree Island Bank and the SULTAN'S SHOAL (a reef of rocks), that lie north by east four miles from Tree Island, and north-west half west from the south end of Barn Island. Being to the eastward of Tree Island Bank, steer for the south end of Barn Island, off which lie the Rabbit and Coney, and connected therewith by a reef of rocks, partly dry at low water. Should night be coming on, and the navigator be unacquainted with the coast, it will be prudent to anchor under the west side of Barn Island, at from three quarters to one mile and a half off it, in soundings from eight to eleven fathoms, where he will be out of the stream, and may remain in safety during the night. There are several other patches, from six and a half to nine fathoms, in the fair-way, between Tree and Barn Islands, where ships may anchor occasionally; but the former anchorage is preferable.

The TIDES. The flood from the Bay of Bengal sets through the Straits of Malacca to the Carrimons; and about Tree Island it meets the flood-tide which comes from the China Sea by the Straits of Sin-

capore, producing a division of the tides in this place. About Tree Island it sometimes sets fair through the channel about west-north-west and east-south-east, five or six hours each way; at other times six hours in one direction, and twelve or eighteen hours in the opposite one, being very irregular both in point of strength and direction. It sometimes sets north-west and south-east, and sometimes north and south, between the Straits of Durian and the west entrance of the old Straits of Sincapore. This uncertainty of the tides renders it highly necessary to watch the bearings of the land, particularly if night be coming on, when, if Barn Island cannot be distinctly seen, or the north end of the Little Carrimon, it would be imprudent to pass Tree Island until daylight.

Red Island takes its name from having a beach of red sand, and is covered with green trees. It is two miles and three-quarters east-south-east from Tree Island, and three miles and a quarter south-west from the Coney. Between Red and Tree Islands there are rocks and shoal water that make the approach dangerous, particularly to ships coming from the eastward in the night, which, having passed the Rabbit and Coney, are liable to be horsed to the southward by the current; this should be carefully avoided, and more especially if the wind be scant from the northward.

Barn Island, so named from its resembling the roof of a barn, is called by the French Passage Island, and is east a quarter north seven and a quarter leagues from the Little Carrimon, and east by north half north from Tree Island. It is covered with trees, and may be seen five leagues; is bold to within half

a mile on its western side, in soundings from nine to eleven fathoms; but the shore is rocky at low water, requiring care in landing with a boat. This island is very convenient for strangers to anchor during the night. They should bring its south end about east-south-east, one mile, in eleven fathoms, where they will be out of the stream of the tide that sometimes runs rapidly through the strait.

ALLIGATOR ISLAND nearly joins the north-west end of Barn Island. The space between them, being rocky, affords no passage for ships. It is about the same size and height as Barn Island, and may be approached on its south-west side to ten or eleven fathoms, at the distance of three quarters of a mile.

The RABBIT and CONEY are two small islets of moderate height, and partly covered with trees. They are connected with the south-east end of Barn Island by a reef of rocks partly dry at low water. The Coney, or outermost, is the smallest; it is about half a mile from the point of Barn Island, and bears south 33° east from its centre. The Rabbit is south 51° east from the centre of Barn Island, and they bear of each other north 19° east, and south 19° west. From the top of the Coney Captain Ross observed the highest peak of the Great Carrimon, by the theodolite, to bear south 78° 25′ west; the middle peak of ditto, south 86° 5′ west; the tree on Tree Island, south 81° 9′ west, being nearly under the middle peak of the Great Carrimon; a large tree on Red Island, south 44° 37′ west; Buffalo Rock, north 89° 45′ east; the south point of St John's Island, north 61° 43′ east. The soundings, within two cables' length of the Coney, are from twenty to twenty-five fathoms. Ships in passing keep about

that distance from it, and should, in working, avoid standing far over to the south side of the channel, on account of deep water with rocky bottom, which is unsafe to anchor in. Some of these rocks are just covered at low water, and lie about a mile from the starboard shore in proceeding to the eastward.

MIDDLE ISLAND is on the north side of the channel, full half-way from the Coney to St John's; it is a low green island, with others projecting from its north-west end. A spit or prong runs off from its south-east side, and some points of rocks which are nearly even with the water's edge lie east-south-east of Middle Island about one mile. There is deep water inside of this latter reef, several ships having by accident been to the northward of it. The Carron rubbed her sides against the north part of it, which is steep-to on its north side. The south side is avoided by not keeping the south point of St John's more easterly than east-north-east half north. Between Middle Island and the Coney, the north side of the channel is partly bounded by shoals and coral-reefs, some of which are dry at low water.

The dangers on the south side of the channel are, first, a reef of rocks about four miles south-east of the Coney, which are only partly dry at low water; there are forty fathoms close to this reef, rocky ground.

BUFFALO ROCK, about four miles north-east of the last-mentioned reef, six miles nearly due east from the Coney, and south-west by south, five miles and a half from the south point of St John's, is about half-channel over between that island and those which form the southern side of these straits. It is a black rock about the size of a long-boat, always

above water, with soundings from forty to sixty fathoms near it. The ship Soliman Shah was drifted by the tide so near to the Buffalo Rock, that she let go her anchor in sixty fathoms, from which she cut, upon a breeze springing up, to avoid the danger. It is therefore prudent to keep nearest the north shore, making short tacks, and not to deepen to more than from thirty to thirty-four fathoms towards the Buffalo Rock and the south side of the strait, which is yet but imperfectly known.

The next danger consists in Two Ledges of Rocks bearing south 42° east and south 45° east from the south point of St John's, distant about five miles, and about six miles eastward from the Buffalo Rock, lying near each other, and parts of them are always visible above water. There are overfalls and shoal-water near them to the north-east and east, which makes it prudent to avoid the south side of the strait until several miles eastward of St John's.

The Tides set fair through the strait east-north-east and west-south-west, between the Coney and St John's, frequently very rapid, with eddies on the springs. Their velocity when strongest is from four to four and a half miles an hour, making it unpleasant anchorage here for large ships, but more particularly for a fleet, and when the weather is unsettled in the night; but when it is favourable and the tides moderate, you may conveniently anchor in any part of the north side of the channel between the Coney and St John's, should calms or other circumstances render it necessary. The best anchorage, however, hereabout is upon a bank of rotten rock and coarse sand, having soundings from fifteen to eighteen fathoms, directly fronting Middle Island.

In case of ships parting in the night, which in the strong eddies they are liable to do, it is advisable, if the land can be seen, rather than let go another anchor, to endeavour to get shelter under St John's, or to run round the Coney and anchor under Barn Island; in either of which situations you will be out of the stream. If under St John's, reduce sail in time, as the depths decrease rapidly from thirty to twenty-six and sixteen fathoms on the bank; and in a dark night it would be imprudent to anchor under twelve fathoms, on account of rocky flats which stretch out from the islands that lie between St John's and Sincapore, with very irregular soundings near their edges, from nineteen to six or four fathoms. The best anchorage under St John's is about a mile and a half or two miles off the east side, the body of the island bearing from west-south-west to south-west by west, in from ten to sixteen fathoms.

It is not advisable to anchor off the south end of St John's; for the tides are there very rapid, with strong eddies.

If the night be not very dark, either Barn Island or St John's will be visible; and when you are midway between them, both may be seen at the same time. As a guide, the south end of Barn Island, from west three quarters south to west by south half south, is a safe bearing; or the south end of St John's, from north-east by east to east-north-east half north; but when near it, the south end of this island may be brought to bear from north-east to east-north-east half north in working. When approaching the meridian of the Buffalo Rock, observe that it bears south-south-east from the centre of Middle Island.

Abreast the south end of St John's a ship ought not to anchor if she can avoid it; for the water is deep, and the tides run in eddies with greater rapidity than in any other part of the straits. The flood has been observed, in both monsoons, to run westward ten or twelve hours at a time, or even eighteen hours, varying in its strength; at other times, six hours flood and as many ebb; but the tides throughout Sincapore Strait are seldom very regular. The perpendicular rise and fall of the water is about fourteen feet on the springs.

Sincapore Town (flag-staff), in latitude 1° 17′ 22″ north, and longitude 103° 51′ east, is four miles directly north of St John's centre, or north a little westerly from Signal Island. This place is becoming very populous, and will probably be of great importance to the British nation, both in point of trade and for the protection of ships of any size during war, or for refitting in case of accident. It is also central with respect to Java, China, and our Indian possessions, which, together with the probability of establishing docks for ships, renders this lately-acquired settlement of the utmost consequence to commerce.

To Sail into Sincapore Road in coming from the westward. After having passed near to *the eastward* of St John's and Signal Island, steer north by east or north, as the wind or tide may require, and you will shoal to five fathoms on the mud-bank, and afterwards deepen to eleven or twelve fathoms. Continue the same course till you find yourself in nine or eight fathoms; then reduce sail and anchor in seven or six fathoms, with the flagstaff on the hill at the back of the town bearing west-north-

west, Signal Island south by west, and Deep Water Point north-east, off shore about a mile and a half. When working into the road, do not borrow toward the islands between St John's and Sincapore nearer than to bring Signal Island to bear south or south half east at farthest. A lighthouse is in contemplation to guide ships in entering the road at night.

From the south end of St John's, PEDRO BRANCO bears east by north about eleven leagues. In this passage the south side of the channel should be avoided, until some miles to the eastward of St John's, on account of several ledges of rocks already mentioned; but the north side may be approached to twelve or ten fathoms, between that island and the red cliffs near the eastern end of Sincapore. The depths in the middle of the strait are generally between thirty-two and forty fathoms, from St John's until nearly abreast of the above red cliffs. They then decrease to twenty or eighteen fathoms, but are irregular off BATTAM ISLAND, which here forms the south side of the strait, from twelve to sixteen fathoms near its north-east point, which also forms the entrance of Rhio Strait on the west side; and this point bears east quarter south from the south side of St John's, distance about four leagues.

The north-east point of Battam may be approached within two or three miles; but mid-strait is the best track with a fair wind, or even with a working wind, to benefit by the current when favourable. If you are in deep water and losing ground, haul in toward the north shore, and anchor in from twenty to fifteen fathoms. When the east end of Sincapore is brought to bear north by west, the north side of the strait should not be approached

nearer than two leagues; but the mid-channel track ought to be preserved in passing.

JOHORE SHOAL has only two and a half fathoms, hard sand, at its shoalest part at low water, three and three and a half fathoms on its southern extremity, and from twelve to fifteen fathoms very near to it on its south, east, and western sides. The south end of St John's bears from its eastern extremity south-west by west half west; Johore Hill north-north-east; South Cape of Johore east by north half north, and it is three or four miles distant from Johore Point, and four or four and a quarter miles from the east point of Sincapore Island, directly fronting the entrance of the old Strait of Sincapore. A small hill on the east side of this strait, to the northward of Johore Hill, called False Johore Hill, bears north from the east end of the shoal, and it is in one with the east point of Sincapore Island, bearing north 40° east. As the water shoals quickly from seventeen or eighteen to fifteen, twelve, and then four fathoms on its eastern extremity, do not borrow under sixteen or seventeen fathoms towards it, but keep about mid-strait in the night; attending to the lead, if your distance from either shore is not distinctly perceived. In the daytime, by keeping the south end of St John's to the westward of south 65° west, you will pass clear to the southward of the shoal. There is no safe passage between the north-west end of the shoal and Sincapore Island; but between the east side of the shoal and Johore Bluff Point there is a secure channel two or two and a half miles broad, leading into the old Strait of Sincapore, with depths of from eight to twelve fathoms, decreasing to five

and four and a half fathoms near the shore, and to six fathoms near the north side of the shoal. To avoid Johore Shoal in coming from the eastward, go no nearer to the north shore than seventeen fathoms after Johore Hill bears north, or Barbucit Hill north, east three quarters east. The breadth of the channel between the Shoal and Battam north-east point, nearly opposite to it on the south shore, is about six miles, and the soundings between them are mostly from twenty to twenty-four fathoms in the fair track, decreasing towards the edge of the shoal, and also near the south shore to the westward of the point; but to the north-east of this point, off the entrance of Rhio Strait, there are from thirty to thirty-four fathoms in some places. Close to Battam north-east point there is a small island, with rocks contiguous to it.

JOHORE HILL is of a regular oblong sloping form, covered with trees, situated inland from the bluff called Johore Point, which forms the eastern side of the entrance of the old Strait of Sincapore; a little inside of which, on a river of the same name, is situated the town of Johore, formerly a place of considerable trade, but now unfrequented. Between the east point of Sincapore Island and Johore Shoal, the passage is not safe for ships of large size, as the latter is thought to be joined to the point by a spit of two and two and a half fathoms, which Captain Court passed over in a small vessel.

BARBUCIT HILL, in latitude 1° 24′ 30″ north, bearing from Pedro Branco west by north half north, distant fourteen miles and a half, is a regular pyramid rising from the low land, two and a half leagues east-north-east from Johore Hill; and being

only about five miles inland from Point Romania, it is used as a mark in entering the strait. About midway between Johore Point and Barbucit Hill, the land of Johore projects farthest to the southward, and is called the South Cape, bearing nearly east half south from Johore Point, and west from Pedro Branco. The land between it and the point forms a bay, with shoal-water in it; but the depths decrease gradually. There is an indifferent watering-place in this recess, near the second point to the westward of the South Cape, inside of a low black rock, situated near the shore.

Point Romania, in latitude 1° 22′ 30″ north, distant about five miles east-north-east from the South Cape, forms the south-east extremity of the Malay Peninsula; which, with the circumjacent coast, is level land and covered with trees. Close to Point Romania, on the west side, lies Romania River, which has two or three feet water at its narrow entrance at low tide, and is navigable by boats two or three miles inland. Although nothing is found here but timber, fish, and reptiles, water may be procured with ease during the north-east monsoon; but there are several better and more convenient watering-places in the sandy bays between Point Romania and a small round island called Watering Island, about three miles to the westward, directly under Barbucit Hill. Inside of this island there is an excellent stream upon the main, where fresh water may be got with facility in either monsoon; but during the north-eastern the streams between it and Point Romania are more convenient.

Romania Islands, fronting the point of this name, are six in number; the westernmost or

largest is composed of two, very near each other, joined by a reef. The two lying most to the north and south-east are barren rocks, but the others are covered with trees; they extend about two miles and a half north-east and south-west, the largest being within a mile of the point, and the nearest to it. There is a rock about twelve feet above water, near the south point of South Island and South Reef, consisting of straggling cliffs extending to the eastward, which are bold to approach from the south side; but there is a rocky patch with three and a half fathoms on it, about one mile and a half south from Point Romania, and the same distance south-south-west from the largest or south-west island.

South Reef extends north-east and south-west about three cables' length; from its south-west extremity the bluff next to Point Romania bears north by west half west, Barbucit Hill on with the north hump of the large island west by north half north, and the point of Watering Island west, having on it a remarkable green tree. About three quarters of a mile eastward of South Reef is the Whale's Crown, a rock scarcely visible at high tide, having seven fathoms close to it, and eight or nine fathoms around. There is a shoal south-west from the northernmost island about a cable's length; the other rocks amongst these islands are mostly above water, and there are seven fathoms between South Reef and the Islands. There is also deep water around the large island, and between it and the others, with safe bottom, excepting near the rocks.

Little Inner Channel, formed between Point Romania and the islands off it, may be considered safe for small vessels, with a leading wind and

having due regard to the set of the tides, and forms a good harbour in the south-west monsoon, the bottom being all soft. Point Romania is bold to approach, having four fathoms within thirty yards of it, seven a little farther out, deepening to twelve towards the largest island, which is a full half-mile from the point. A ship entering the channel from the southward, or leaving it, may borrow towards South Reef and the largest island, where the depths are greater than near the main; and the best track between it and the other islands is about mid-channel, or rather nearest the islands, where the depths are generally from five to nine fathoms.

There is an excellent watering-place in the river close round the rocky point, about four cables' length to the northward of Point Romania; the adjoining country is not inhabited, but abounds in various species of timber, wild elephants, buffaloes, moose-deer, hogs, guanas, monkeys, peacocks, and other animals; there are, besides, oysters upon the rocks. Near Romania River is a considerable extent of forest, without much undergrowth, and thus easily penetrated; but in other parts the woods are generally impervious.

Great Inner Channel is bounded on the west side by South Reef, the Whale's Crown, and a sunken rock about three quarters of a mile eastward of the latter; and on the east side by the southern extremity of Romania. Outer Reef is about two miles and three quarters wide between these dangerous points; but it was little known to Europeans till Captain Ross surveyed these channels in 1818, although it was formerly used by Chinese junks and coasting-vessels. This channel

is safe by daylight for ships keeping one mile and a half at least to the eastward of the islands off Romania, and not increasing the distance above three or three and a quarter miles, to avoid the south-west extremity of the Outer Reef. The best track is in mid-channel, about two miles from the islands, until the northernmost one bears west-south-west, and then the channel is clear from the Outer Reef to the coast, or about five miles wide. The soundings throughout this entrance, being generally uneven, do not answer as a guide; but they are usually from seven or eight to ten or eleven fathoms, both in mid-channel and near the dangerous objects on either side,—excepting a patch of five fathoms about a mile west by north from the south-west end of the Outer Reef, and bearing east by north from the northernmost island two miles and a half distant.

If the wind should be adverse when a ship is proceeding through the southern part of this channel, she ought not to approach the Outer Reef nearer than to bring Pedro Branco south-east, or on the transit-line between it and False Barbucit Hill; nor approach the Romania Islands and their adjoining dangers nearer than to bring Pedro Branco east-south-east half south, or on a transit-line,* between False Bintang Hill and the north point of Romania, which is situated about four miles to the northward of True Point Romania.

Romania Outer Reef is formed of detached spits of sand and patches of coral-rock, on which the least water appears to be two fathoms and three

* Mr Horsburgh's plan of these dangers, and the soundings around them, in the entrance of Sincapore Strait, exhibits these transit-lines or marks for the channel.

quarters; but there are gaps from six to ten fathoms between them.

The patch of the outer reef, nearest to Pedro Branco, bears north-north-west three quarters west from it four and a half to four miles and three quarters, which is steep-to and dangerous, having only eighteen feet upon it, rocks. The Anna struck on this patch in 1800, whilst rounding its edge very close with the wind north-westerly. The soundings were from twelve to nine fathoms; and a strong ebb tide running to the northward carried her among the eddies on the reef, where she had several casts of seven fathoms. Although drawing only nineteen feet, the ship touched the rocks in hauling off the reef, the edge of which formed a steep wall, rendered very conspicuous by the deep-blue colour of the water outside, while that within was white and discoloured. She took a considerable careen by the fresh wind and strong tide, and grazed over the rocks into twelve fathoms the first cast, Pedro Branco bearing then south-south-east three quarters east about four miles and three quarters; southernmost island off Point Romania, west-south-west quarter south; south point of the largest island, west by south quarter south; and its southernmost hummock in one with the South Cape, or westernmost point of Romania. A few cables' length to the southward of this dangerous patch the depth increases to sixteen and seventeen fathoms; and it is thought to be the south-westernmost danger of the Outer Reef.

To the north-eastward of the patch last mentioned there are several others, with three and three and a half fathoms. The outermost of these bear from north by west quarter west to north by west three

quarters west from Pedro Branco five to five and a half miles, having nine and ten fathoms close on the east side of them.

Another spit to the north-westward of these bears north-north-west from Pedro Branco, and east by north from Barbucit Hill: between them the General Baird passed in six, eight, and ten fathoms water, and near to the former H.M.S. Panther got embarrassed.

The NORTHERNMOST PATCH of ROMANIA OUTER REEF is in latitude 1° 31′ north, and ten miles distant from the coast. It bears from Bintang Hill north 3° west; from Pedro Branco north 9° east eleven miles; and about the same distance from the northernmost island off Romania. From the largest of these it bears north 52° east; from Barbucit Hill, north 65° east; and about east half north from False Barbucit Hill. There is probably no danger on this patch, although the Seaflower had overfalls of six and seven fathoms, hard sand, on it; but the Hornby shoaled suddenly from thirteen to ten, seven, five, and four and a half fathoms, in coming from the northward, and deepened in hauling out to the eastward, as fast as the lead could be hove, to five, seven, ten, eleven, twelve, thirteen, and fourteen fathoms; it ought therefore to be avoided, as four and a half fathoms is too little water for a large ship when there is much swell.

Between the northernmost patch of the reef and the coast there is no danger. The depths are from ten to fifteen fathoms inside of it; and there seems to be a channel of deep water to the south-west and southward between it and the other more connected patches of the reef. Along the inner edge of the outer reef the soundings are mostly seven or eight

fathoms, and nine, ten, or eleven fathoms about half a mile from it; and from thence, well over towards the coast, nearly the same depths, excepting that seven or eight fathoms are obtained in some places.

False Barbucit Hill, in latitude 1° 30′ north, is a low sloping eminence near the sea, appearing like a tope of trees, a little more elevated than the adjacent coast, which is all rather low and woody to the northward of Barbucit Hill. The False Hill bears from Pedro Branco north 45° west, and being discernible much sooner than the other during hazy weather, answers as a guide in coming from the northward toward the extremity of the Outer Reef.

Pedro Branco, or White Rock, in latitude 1° 20′ north, longitude 104° 25′ 30″ east, or 2° 10′ 30″ east of Malacca, and nine miles west from Pulo Aor, is in the middle of the entrance of the Straits of Sincapore, and is eight miles east 15° south, and the same distance from the Bintang Shore, and from Bintang Hill, north 12° 30′ west. It is a small rock above water, deriving a white appearance from birds' dung, and may be seen from the deck of a large ship nine or ten miles, being just visible when Point Romania bears north; but in the night it cannot be seen with the naked eye until close to it. The author was a witness to this last fact, when in company with a large fleet of homeward-bound Indiamen from China; being then in the Duke of Buccleuch, and having the Walpole about half a mile on the larboard quarter. The other ships were all considerably ahead of us, and had got sight of Pedro Branco before dark, the commodore carrying a top-light to guide us. We followed him, making, as we supposed, sufficient allowance for his haul-

ing up between Point Romania Islands and Pedro Branco, when, about 8 P. M. (April 22, 1795) the men on the look-out announced, "*A rock on the larboard bow!*" The helm was instantly put a-port, and we passed to the northward of the rock within half a stonecast in safety, as did the Walpole *to the southward of it.* The tide at this time was running to the westward with great rapidity, and I am inclined to think assisted us in getting off, from the interruption the rock caused in its direction, which, splitting the tide, sent us clear to the northward and the Walpole to the southward of it. She must have passed between Pedro Branco and the SOUTH-EAST ROCKS, which are about south-south-east one mile from it. These latter are just above the surface at high water. The SOUTH-WEST ROCKS are two miles and a half south 16° west from Pedro Branco, and east 27° south from Barbucit Hill, having seventeen fathoms close to them. They consist of three pointed rocks, very little detached from each other, with eight or nine fathoms between them, and are not visible until half-ebb; these rocks must be carefully avoided when adopting the South Channel. The depths between them and the Bintang shore are rather irregular, to nine or eight fathoms, within two miles of the land.

The writer has been about twelve times through the Straits of Sincapore, and always passed *in* or *out* to the *northward* of Pedro Branco, keeping within from half a mile to one mile of that rock; and in going out, bound either to the northward or southward, was careful to get a good offing to the eastward before hauling up for Pulo Aor; or otherwise proceeding to the southward, on account of the occasional

strong indraught of Sincapore Straits, and the dangers that lie on either side of its entrance. If you are proceeding to the northward from these Straits, bring the little or northernmost Bintang Hill open to the westward of the double hill, or by compass south by west, which will keep you clear to the eastward of all the patches of the outer reef. Again, if proceeding to the southward, do not edge away thither until Bintang Hill be brought to bear south-west or south-west by west. These latter instructions are more particularly to be attended to in the night.

Bintang Hill, in latitude 1° 5′ north, longitude 104° 29′ east, five leagues and a half, south 12° 30′ east from Pedro Branco, may be seen in clear weather fourteen leagues, and is a good mark in approaching the entrance of the strait. When viewed from the northward it forms a saddle; and near it, on its north side, is a small conical hill, called False Bintang Hill, or Little Hill, the summit of which is in one with the saddle of the large hill when they bear south 6° east. When the centre of the saddle bears south, the summit of the little hill is just open with the western shoulder of the large hill; and this mark, or bearing of Bintang Hills, is a safe guide to carry a ship to the eastward, though very near to the outer reef of Romania. The north side of the island of Bintang extends nearly east half north, and west half south, about six leagues, forming a concavity in the middle of this space, and, like most of the other islands in the neighbourhood, covered with trees; and, excepting the hills before mentioned, is only moderately elevated. About a mile from the shore, north-east of the point that bounds Rhio Strait on the east

side, there is a small island, with other islets or rocks near the shore, which should not be approached too close, as a patch, with only two fathoms on it, lies a mile and a half off the shore of Bintang, and bears south by west three-quarters west from Pedro Branco; nor should the Bintang shore be borrowed on in general, under ten or nine fathoms, when ships are proceeding through the south channel, for the soundings near it are often irregular, and do not afford a sufficient guide.

The SOUNDINGS, to the distance of four or five miles northward from the most northern patch of Romania outer reef, and from the patch of the eastern bank, are mostly from thirteen to fifteen fathoms, irregular in some parts, and continue nearly the same to within three or four miles of the Malay coast. Navigators obtaining soundings of from eight to ten fathoms on a patch of the eastern bank, in latitude 1° 32′ north, during hazy weather, sometimes think they are on the northern patch of Romania outer reef, and haul more to the eastward, which renders them liable to fall to leeward of the strait, if unacquainted with this navigation.

Between the shoal-patch of the eastern bank and the northernmost patch of the reef, the soundings are, as before observed, a little irregular, from thirteen to seventeen fathoms. Farther to the southward, between the eastern bank and the reef, the water deepens to nineteen, twenty, and twenty-two fathoms; and when Pedro Branco is approached, soundings of from thirty-six to thirty-two fathoms are found near it, to the northward and north-west, decreasing in the north side of the channel to seventeen or sixteen fathoms, sand and gravel, close to the

southern patches of Romania Reef. To the south-west and westward of Pedro Branco, the soundings near it are from thirty-four to twenty-eight fathoms; but there are some small banks with only from ten to fifteen, and having from twenty to thirty all round them, about five miles west by south and west by south half south from Pedro Branco.

The EASTERN BANK extends from the north-east part of Bintang about north and north by west seven leagues, having soundings generally from ten to fourteen fathoms; but two or three leagues from the same point the depths do not exceed twelve. East from Pedro Branco about two leagues, they are from sixteen to eighteen fathoms, irregular in some places, and eleven, twelve, or fourteen, within one or two miles of that rock on the east side. About three or four leagues to the north-east and east-north-east of the same island, the soundings are from thirteen to fourteen fathoms and a half, sand and gravel, and in standing off to the eastward, they gradually increase to twenty at two or three leagues' distance. The small patch mentioned in the last paragraph, which is on this bank, has only from eight to ten and eleven fathoms, hard bottom. The general depth is of small extent, bearing north half east from Bintang Hill, and from False Barbucit Hill east three-quarters north. This last-mentioned patch, and others that lie five miles west by south, and west by south half south from Pedro Branco, having from ten to fifteen fathoms, are apt to mislead ships, if not carefully guarded against; and more particularly in the night, or when the land is obscured in the daytime, and consequently no bearings are obtainable.

The TIDES near Pedro Branco, and contiguous to the reef off Point Romania, are frequently very irregular in their time, velocity, and direction, and therefore require the utmost vigilance of the navigator during the night, or upon its approach. In the strength of the north-east monsoon, when the current flows to the south-east from Pulo Aor across the equator, the flood sometimes runs into the entrance of the strait to the south-westward ten or twelve hours at a time; but the ebb generally goes with greater velocity, and longer in both seasons, more particularly in the south-west monsoon. About the full and change of the moon, the ebb often sets out strong during the night for ten or twelve hours together, but not very rapid in the first and latter parts; at other times it is fluctuating and weak. Between Pedro Branco and the edge of Romania Reef, the strength of the ebb runs generally about north-east by north when regular, and the flood in the opposite direction; but Mr Horsburgh has sometimes observed the tide to set all round the compass during the night, and once north-north-west, two miles an hour directly over the reef. About the northern patches of this reef, the tides have also been sometimes found very irregular, setting east and west, and all round the circle; but their general direction is nearly north and south, or within two points of the meridian. In the south channel, between Pedro Branco and Bintang, the flood sets about west-south-west, and west by south, and the ebb in the opposite direction along the shore of the latter, but subject to irregularities.

On the full and change of the moon, it is high water at Pedro Branco about eleven hours, when the

usual degree of regularity prevails. The velocity of the ebb, when strongest, is from four to four and a half miles an hour in the entrance of the strait and between Point Romania and Pedro Branco; but the flood is not so strong. The strength of the tides during the neaps is from two to three miles an hour, and they are frequently very irregular. The Shah Munchah, a large and valuable country-ship from China to Bombay, standing into the strait at noon with a strong tide and scant wind, stood too near Pedro Branco before tacking, and was totally lost, by the tide horsing her upon the rock whilst in stays.

North Channel, formed between Pedro Branco and Romania Reef, has been hitherto in general use; but it is not quite so wide as the South Channel, nor so safe in the night. Those who may prefer it, when they have passed Johore Shoal about mid-strait, with the wind to the southward, should keep well out from the Romania shore, and endeavour to get sight of Pedro Branco, bearing east-north-east, or east by north; then borrow towards it with the ebb-tide, to give a proper birth to the edge of Romania Reef in steering out of the strait; they should not approach the reef under sixteen or seventeen fathoms, when Pedro Branco bears from south-east to south, particularly with a southerly wind.

After Pedro Branco is brought to bear south-south-west, edge away to north-east, taking care to keep it to the westward of south-south-west, whilst in sight, or having brought the centre of Bintang Saddle Hill to bear south, keep to the northward, observing on no account to bring Bintang to the eastward of south, in passing outside the outer reef,

but rather incline to the eastward, until you are clear to the northward of all the dangers on the outer reef.

In coming out of Sincapore Strait in the evening, and having no sight of Pedro Branco from the deck, it will be prudent to haul in towards the land to the westward of Point Romania, and anchor in from ten to eighteen fathoms. If, however, you are resolved to take advantage of a fair wind during the night, endeavour to pass Point Romania at the distance of about four miles, in soundings from eighteen to twenty-two fathoms, and preserve these depths if possible, borrowing a little on either side of the channel, as the prevailing wind or tide may render it advisable. The author, in such cases, has found a good night-glass of infinite service, having often by its assistance discovered Pedro Branco, Pulo Sapata, and other small islands, and been thereby enabled to take advantage of the wind, which might otherwise have been lost by lying-to or anchoring for the night.

South Channel, formed between Pedro Branco and its adjoining rocks to the north, and the island of Bintang to the south, being rather wider than the North Channel, is preferable to sail through in the night, though until a recent period it was little known. The depths in the South Channel, although not very regular, are usually seven, eight, and nine fathoms near the shore of Bintang; from ten to twelve in mid-channel; and from fifteen to sixteen near the rocks to the south-east and south-west of Pedro Branco. These depths are greater to the *westward* of Pedro Branco than in its meridian, which ought to be kept in remembrance during the night.

In proceeding out of Sincapore Strait by the South Channel, if not so far advanced as to discern Pedro Branco before dark, steer towards the north-west point of Bintang, if the wind be southerly; taking care to give a birth to the small island, and to the patch of two fathoms that lies about a mile and a half off that shore. After passing these in fourteen or fifteen fathoms, keep within three or three and a half miles of the Bintang shore, particularly when abreast of the ledge of rocks to the south-south-west of Pedro Branco, that bounds the channel on the north side in this part, which is nearly six miles wide between this ledge and the Bintang shore. There are sixteen and seventeen fathoms very near these rocks, and when abreast of them, from fourteen to twelve affords a safe track; but the best plan is to take the soundings from the Bintang side, hauling in occasionally to twelve fathoms; but not under that depth in the night, and edging out to eleven and twelve. The bottom, in eight fathoms, near the shore, is often hard sand; but out in ten and eleven, about mid-channel, it is clay in some parts, or sand and gravel mixed with clay.

You may stand toward the Bintang shore in some places to eight fathoms in working during the day, and out to thirteen or fourteen; but in the night do not deepen to more than thirteen, when abreast of the ledges of rocks that lie to the south-east and south-west of Pedro Branco. About south by east three-quarters east from the island, Captain Cowman had five fathoms and a half on a bank about two miles and a half from Bintang, with seven and eight fathoms close round it, when passing out of the Straits of Rhio by the South Channel in the night.

Captain J. Lamb of the Palmyra, working through the South Channel to the eastward during the night, put the helm down in ten fathoms, to stand off from the Bintang shore; but, owing to a strong tide running out, she missed stays, and although she wore quickly round, shoaled to six fathoms. He then steered to the north with a light breeze for half an hour, and was swept along shore by the rapid tide over very irregular ground; the depths varying from nine to six fathoms at a cast, and once to a quarter less five fathoms. During this time, Bintang Saddle Hill was hidden by the low land intervening; and when it again appeared, after standing out to ten fathoms, it bore south by east half east. From the north-east extremity of Bintang, a reef projects to a considerable distance, which should be carefully avoided.

When proceeding out of the South Channel by night, Captain Lamb observes, that the summit of Bintang Hill should be kept visible over the low land in clear weather, to prevent getting too near the Bintang shore; and when the hill is brought to bear south by west, you may edge away to the northward, if certain that the ebb-tide is running out of the strait. But if the wind be unsteady, and the direction of the tide unknown, continue to steer north-east for some time, until well outside of Pedro Branco and Romania Reef, to prevent the flood-tide from drifting you near either of these dangers.

You may anchor conveniently in the South Channel during the day or night, the depths in the middle, as before observed, being eleven or twelve fathoms, and near the Bintang shore from nine to seven or six, irregular hard sand-clay. This advantage of

anchoring renders the South more eligible than the North Channel; but the latter, if you are bound to the north, is preferable. Ships from Sincapore to the coast of Borneo, or intending to proceed by the eastern passage towards China, are frequently several days working out of Sincapore Strait, when the north-east monsoon blows sometimes strong into it, during November, December, and January. It may therefore be advisable, after reaching the entrance of Rhio Strait, and finding the weather dark and cloudy, with a strong gale blowing from the north-east, not to lose time in working out to the eastward with the ebb-tide, and anchoring on the flood; for, in such case, considerable fatigue to the crew, wear and tear of ground-tackle, and probably some time, may be saved by proceeding to the south-eastward through Rhio Strait. Here you will have smooth water and favourable breezes, and when through it, may haul to the south-eastward, between Geldrias Shoal and Pulo Lingin; then steer eastward for the Carrimata Passage, as the wind generally draws to the northward when the equator is approached.

III. Directions for Sailing between Bengal or Madras, and the Straits of Malacca. *By* James Carnegy, *an experienced Commander in the Country-trade of India.*

Ships leaving Bengal in the north-east monsoon, bound to the Strait of Malacca, should, on leaving the pilot, keep their wind to weather the island of Preparis, or pass close to the westward of it, when they will have a fair wind all the way. They will experi-

ence a current to the westward, crossing from the Sand Heads to Cape Negrais, continuing perhaps ninety or a hundred miles. Ships should haul close round Junkseylon and the Brothers, and if they can go within Pulo Bouton they ought to do so, as there is a strong offset or current to the westward all along the bay.

Ships leaving Bengal, bound for the Strait of Malacca in the south-west monsoon, should, on leaving the pilot, keep the wind free, and pass between the Great Andaman and the Coco Islands, or to the eastward of the Cocos, if they cannot be conveniently weathered; but let them be careful of coming near the Preparis in this season, as there is a shoal which lies west-south-west from the south end of this island—three or four leagues distant. The brig Athena, Captain Daniel, from Rangoon to Bengal, was wrecked on the outer sandy islet of this reef, on the night of the 26th July 1815. He states it to be about twelve miles distant from Preparis Island. Captain Balston, of the ship James Drummond (who took Captain Daniel and part of his crew off the islet on the 13th August following, the rest having quitted it on a raft), describes the reef as extending about twenty miles to the southward in detached patches, many parts dry at low water. Perhaps the estimated distance is too great; although it is certain that this dangerous reef extends a great way out to the south-west of Preparis Island, and ought to have a wide birth in passing.

After leaving the Cocos and Andaman Islands, ships should keep the wind a little free, and steer for the Seyer Islands; then pass to the eastward or westward of Pulo Bouton, as may seem proper.

Departing from Madras for Malacca Strait in the early part of the north-east monsoon, it may be best to fetch where you can to the southward of Acheen Head, and work through the Surat or Bengal Passage, and afterwards along shore to Diamond Point, from whence you cross over to Penang. In the latter part of the north-east monsoon, or after the 15th of February, when the southerly winds have set in, it may be best to proceed along shore as far as False Point, or even to Point Palmyras; then stand off to pass through one of the channels between the Great Andaman and Cape Negrais, as if coming from Bengal.

Ships leaving Madras for the Malacca Strait in the south-west monsoon should make a fair wind of it, and steer to go through the Ten Degrees Channel, in place of sailing close by the wind for Acheen.

Leaving the Straits of Malacca for Bengal in the north-east monsoon, ships should go to the eastward of the Andamans if the wind be favourable; but they ought to lose no time tacking about, as the farther they are off the eastern or western shore, the more the wind will draw to the eastward; so, rather than lose time, they should pass through the Ten Degrees Channel, and after reaching the latitude of 18° or 19° north, if not far enough to the eastward, they can make a stretch that way for a day, or more if necessary.

The Pilots, in this monsoon, are found between the Eastern Sea-reef and Saugor Island, in latitude 21° 5′ north. In the south-west monsoon, they are found in from twelve to fifteen fathoms water, between Point Palmyras and the Western Sea-reef.

Ships leaving the strait, and bound for Bengal or

Madras in the south-west monsoon, or if bound across the equator, should keep along the Pedir Coast, where they will always be favoured by a current to the westward and a land-wind at night. They should go through Acheen Road, and, if blowing weather prevail, anchor for a few days until it moderates, then push through the Bengal Passage, and they will weather the Nicobar Islands with ease; thence ships bound to Calcutta will have a fair wind. If bound to Madras, they may probably, if the wind hang far to the westward, be obliged to tack now and then to get to the north-westward; but on no account should they cross the equator to get westing, but rather make the Coromandel Coast, and beat down along shore. Ships bound across the equator to Europe or other western ports, on leaving the Bengal or Surat Passage, ought to carry a press of sail to get westing.

In the south-west monsoon, a fast-sailing ship bound to Calcutta may always with safety go up within the Andaman Islands, and pass the Cocos either to the eastward or westward; but it is preferable to pass to the westward, being in such a case more to windward; and hence she will with ease fetch Point Palmyras, or even False Point, if required.

CHINESE

MATHEMATICS AND ASTRONOMY.

CHAPTER IV.

Mathematics and Astronomy.

Very limited Mathematical Knowledge of the Chinese—Their Arithmetic—They possess Logarithms—Astronomy very early cultivated in China—Eclipses calculated and observed—Cycle of Sixty Years—Compass—Division of the Cycle and Year—Negligence and Punishment of Astronomers Hi and Ho—Remarkable Phenomena in the Heavens—Ceremonial of observing Eclipses, and distributing the Calendar—Chinese Determination of Obliquity of Ecliptic—The Chinese less advanced than the Greeks in Astronomy at the same Period—The Astronomy of the West may have been imported into China—Chinese Astronomy tainted with Astrology—Singular Belief as to the Cause of Eclipses—Precession of Equinoxes first noticed—Measurement of Degrees attempted—Failure of predicted Eclipses—Determination of Solar and Lunar Periods—Decline of Astronomy—Table of Length of Solar Year and Lunar Periods at different Times—Introduction of European Astronomy into China.

If we were to form an estimate of the state of the mathematical sciences in China, from the very long period during which astronomy, one of the most important, has been cultivated in that country, and were we to consider that this branch requires for its improvement the aid of several others, such as arithmetic and geometry, we would naturally conclude, that this very ancient people must long ago have advanced a great way in the knowledge of these studies. Such an inference would, however, be very

far from the truth; for their acquaintance with the exact sciences cannot for a moment bear comparison with that of Europeans. It is true, that in some inventions,—the mariner's compass, for example,—the Chinese have preceded other nations; but in no case have they by the force of genius carried them to the perfection which they have attained elsewhere. The learned Jesuits, who went to China with the view of planting Christianity, and to whom we owe our knowledge of that country, have attributed this entire stagnation of pure science to the want of encouragement. The kinds of knowledge held in most estimation, and which pave the way to preferment, are law and government. It is by these a man becomes a mandarin of letters, and obtains honourable distinction and profitable employments, while the advantage to be derived from mathematical pursuits is very limited. The culture of astronomy is indeed required by the statutes of the empire, and there is a Board of Mathematics, a sort of academy for their conservation; yet this affords but few openings, and the advantages it holds out are very slender. Hence it happens that men of genius neglect that kind of knowledge, and pursue the more popular branches which lead to honour and emolument.

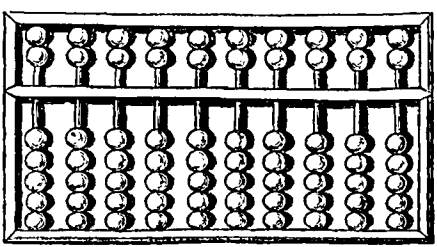
The cause just assigned will account for the slow progress of mathematical investigation, though it does not explain why it is altogether at a stand. The study of nature and of philosophy was not the road to fortune in ancient Greece, nor is it in modern Europe; yet the Greeks had their Euclid, their Archimedes, and their Diophantus; and in our own country, we frequently see the most ardent minds pressing forward in the path of improvement and

discovery, with no other stimulus to exertion than an innate love of science for its own sake. High attainments do indeed sometimes lead to pecuniary advantage; but the labour required to obtain even a chance for this, would almost with certainty have ensured success and greater wealth in various professions.

It would seem, therefore, that we must look to other causes for a state of things quite peculiar to China: there must be something in the national character and constitution of the people, which proves a bar to their advancement in science, just as in some other nations there is an opposite tendency. There seems, then, to be a want of inventive genius among the Chinese,—that talent which distinguished the ancient Greeks so much above all other tribes at the same period. The excessive veneration of the former for their ancestors, too, although in some respects virtuous and praiseworthy, cannot fail to act as a drag on improvement. When Europeans first arrived among them, their geometry, according to the missionary, P. Gentil, consisted merely of some rules of mensuration. The celebrated proposition, that the square on the side opposite to the right angle of a right-angled triangle, is equal to the squares on the sides containing that angle, was familiar to them ten centuries before it was known to the Greeks. Yet this important element of knowledge, which was the fertile germ of the most valuable discoveries among the latter people, remained altogether steril in China.

Although spherical trigonometry be so essential to astronomy, the Chinese had no acquaintance with it until the thirteenth century, when it first became known to Co-cheou-king, the president of the Board

of Mathematics. Before his time, it was understood in a general way, that the proportion of the circumference of a circle to the diameter, was as three to one,—a rude approximation, inasmuch as it supposed that the circumference of a circle might be accounted equal to the perimeter of its inscribed hexagon. The method of calculating right-angled rectilineal triangles, and oblique-angled triangles, by reducing them to two right-angled triangles, was then also received; by this means, as well as by trial, somewhat was understood concerning the proportion of chords in a circle to its diameter. This seems to have been the extent of their knowledge, at least so it appears from certain monuments which still remain. It is not now exactly known how Co-cheou-king came by his methods, but there is no reason to suppose them to be a creation of his own.



Swan-pan.

The Chinese employ the decimal notation; but their arithmetic was not more advanced than their geometry when the Europeans originally visited them. It consisted of the simplest operations; and these were performed by means of an instrument called *Swan-pan,* which is represented by the figure delineated above.

It consists of a frame, divided into two compartments by a bar in the direction of its length. It is next crossed by ten wires or slender rods, which pass through the middle bar, and terminate in its longitudinal opposite sides. Each cross-rod has on it seven moveable beads, which admit of sliding backwards and forwards; five of these are on the part of the rod between the sides of the wider compartment, and two on the part which crosses the narrower. Beginning from one extremity of the frame, each of the five beads on the longest part of the first rod represents a unit, and each of the two on the shorter stands for five. In like manner, each bead on the longer part of the next rod, towards the left hand, stands for ten, and each on the shorter part for five tens or fifty, and so on. It is easy to understand, that by detaching a proper number of beads, which represent units, and tens, and hundreds, &c., by sliding them from the position in which they are represented in the figure, towards the bar which crosses the rods, any number whatever may be indicated; a single bead on the shorter part of the rod answering to all the five on the longer.

In this way the Chinese perform their arithmetical operations, just as men reckoned by counters in this country, in the manner explained by the older writers on arithmetic, particularly by Robert Recorde, who lived about the time of Queen Elizabeth. The *Swan-pan* seems the more convenient mode of the two; and by its assistance the traders in Canton transact their business with a dexterity and expedition quite remarkable. It must, however, be admitted, that although this machine be well adapted for explaining the principles of arithmetic,

it would be a very inadequate substitute for our Arabic numerals, more especially in those laborious calculations which the progress of European science has rendered indispensable.

Sir George Staunton says, that the Chinese have no characters, except those in their common language, to express sums in an abbreviated form, after the manner of the Arabic figures used by Europeans. When, however, they have occasion to introduce numbers in their writings, they have recourse to their ordinary terms, each of which denotes a numerical value, independently of its relative position,—a method less tedious indeed than the expression of the same numbers by the method of alphabetical writing, but which by no means equals the conciseness of the same process in the Arabic notation. The universal multiplication and subdivision of all quantities by decimal proportions, facilitates their calculations, and prevents the necessity of methods to abridge them.

But we are not aware that this people have at any time made the least improvement in the science of arithmetic beyond the use of the decimal notation. It is, however, a curious fact, that they have adopted one of the greatest improvements that ever was made in Europe, namely, the application of logarithms to calculation. In the library of the Royal Society of London, there is a table of these printed in the Chinese character. It consists of two thin volumes, each containing the logarithms of 50,000 numbers; every page contains three columns of natural numbers, and three columns of their corresponding logarithms; each column extends to fifty lines. The numbers begin at the end of the

volume, and the first column is on the right-hand side of the page; but, unlike the usual mode of writing the Chinese character, the figures read from left to right. There is no column of differences, nor any running-title, and the volumes are without titlepage, preface, or instructions. They are printed on a beautiful thin yellow paper, which is double, as is usual in their books. The natural numbers are given in red ink, and the logarithms in black. This curious work was presented to the Royal Society by PÈRE GAUBIL in 1750; also another volume, which contains the logarithmic sines, cosines, tangents, and cotangents, to every ten seconds. It has a heading of red ink, is executed on the same kind of paper as the former, and resembles it in many respects. The length of the printed part of the page is 8⅝ inches, and its breadth 5⅝. A question naturally occurs with regard to these tables: Have they been copied from others computed and printed in Europe? or have they been constructed in China? This question can be answered with perfect certainty. Mr Babbage, in preparing a table of logarithms, with a view to accuracy, compared them with those published by others at different times and in different forms; and he discovered that six errors were common to almost all the tables,—a proof that they were copied from each other, or from some original one that contained these errors. This remarkable fact induced him to examine whether these mistakes were in the Chinese table; and he found that it contained the very identical six. Thus, it was evident that their table was copied from some one of those printed in Europe; it was, in fact, from that of Vlacq, the original source of the inaccuracy,—a work which

came out in 1628. The Chinese trigonometrical table was probably copied from the *Trigonometria Artificialis* of VLACQ, which was printed in 1633. These three Chinese volumes, united, would form a moderately-sized royal octavo, and are comprised in a smaller space than any tables of an equal number of figures published in this part of the world.*

The logarithmic tables must have been introduced into China by the missionaries, no doubt with a hope of exciting a taste for mathematical science, to which they afford such powerful aid. We have no evidence, however, of their having produced such a happy effect. Astronomy is indeed the only study connected with the mathematics to which the Chinese have turned their attention; but the progress which it had made in that country, when compared to the time it had been cultivated before the Jesuit missionaries obtained a footing among them, was extremely small. It is reasonable to suppose, that the students of astronomy would be more numerous than the mathematicians, considering the political importance attached to the former, and the abstract nature of the doctrines which form the subject of the latter. In fact, the different degrees of estimation in which the two sciences must be held in a country such as China, warrant us to expect that mathematical works would be very rare. The low state of their astronomy, too, shows that it had derived little advantage from such treatises; hence it may be inferred, that there existed in that country no mathematics by which it could be improved.

The Chinese annals record a series of eclipses during 3858 years, and, what is most remarkable,

* Memoirs of Astronomical Society, vol. iii. p. 65.

this long list contains only a single eclipse of the moon: all the rest are of the sun. If we may believe the authors, all these phenomena were calculated before they happened, and carefully observed in the order of their occurrence. The same annals, however, are entirely silent in regard to all the other circumstances connected with them. The Chaldeans indicated the quantity of an eclipse; the part north or south that was obscured, and the time, nearly, of the beginning and end. To predict with certainty eclipses of the sun, besides the knowledge of the mean motions, an acquaintance with the inequalities of the motions, as well as with the doctrine of parallaxes, was required. Now, as it does not appear that the Chinese were acquainted with these at a period when their history may be regarded as authentic, much less can we suppose they were more learned during their fabulous ages. It is difficult to reconcile these discordant authorities.

There is an extensive work, in thirteen quarto volumes, entitled, *General History of China, or Annals of that Empire*, translated from the Tong-kien-kang-mou, by P. Moyriac de Mailla, a French Jesuit missionary at Pe-king, and published in Europe, in the interval between 1777 and 1785. It is stated in this huge compilation, that in the year 2857 before the Christian era, the motions of the heavens, the knowledge of which serves to regulate time, were an object of the most serious application to Fou-hi. He was most anxious to instruct his people in this branch; but they were then in too rude a state, and too little advanced to be able to comprehend his theories. He therefore contented himself with giving them a single rule for reckon-

ing time, by means of the numbers 10 and 12, the characters of which combined gave a cycle of 60 years, and which were also the foundation of the rule of the hours and the days, the months and the years,—a formula so commodious, that it has been preserved in China from the age of Fou-hi down to the present period.

It is easy to conceive such a state of ignorance at so remote an epoch; but how happened it that Fou-hi was himself better instructed, or whence did he derive that knowledge which he in vain attempted to communicate? Many inventions, wonderful for that time, have been ascribed to him. In this the history of China resembles those of Greece and Rome, and of other rude nations. In fact they appear a tissue of fables.

In the year 2608, B. C., Hoang-ti erected a great observatory to rectify the calendar, which was very defective. He chose from among his officers those who seemed to have most talent for astronomy; he commanded some to examine the course of the sun, others the course of the moon, and others the motions of the five planets; and from their united observations the difference of the motions of the celestial bodies were to be deduced. It was then found, by the difference of the motions of the sun and moon, that twelve lunar months did not constitute an exact solar year, and that in order to rectify the lunar year, and make it agree with that of the sun, it was necessary to intercalate seven lunations in the space of nineteen solar years.

Supposing this to be true, the Chinese had done, 2600 years, B. C., that which the Athenians did not accomplish till 600 years before the same era, by

nearly the same means. The authenticity of the Chinese epoch, however, is not so well established as that of the Greeks, whose writings we possess and understand. Hoang-ti directed his astronomers to construct a machine that should exhibit the observed motions of the heavens. The reasons for the method of intercalation were explained to him, and he was well satisfied. We have not been told upon what kind of observations the cycle was founded; we may, however, suppose, that they were the new and full moons, and perhaps the gnomon, and the heliacal risings and settings of the stars. This prince is said to have been the inventor of several instruments for celestial observations; and, among others, of one which served to determine the four cardinal points without considering the aspect of the heavens. This could only be the compass, and, if it was so, the Chinese must have possessed this invention more than 4400 years ago. There are, indeed, distinct traces of it 1400 years later, under the reign of Thing-gu.

In the year 2461, B. C., Tchuen-hio, knowing by calculation that in one of the years of his reign the planets would be in conjunction in the constellation *Che* (which occupied seventeen degrees of the heavens, and the middle of which was about the sixth of Pisces), he chose this for the first year of his calendar; and more especially because that, in the same year, the sun and moon were in conjunction the first day of spring. Now, although a conjunction within the space of 17° is not a thing absolutely impossible, yet the additional circumstance of the new moon falling on the first day of spring renders it less probable, and it must

be supposed, either that the whole is a fable, or that the supposed conjunction was the result of the errors of the supposed motions. The Chinese, as well as the Indians, assumed for their primitive epoch a general conjunction.

The annals go on to say, that in the year 2357, B. C., Yao applied himself to the re-establishment of astronomy, which had been neglected. He enjoined his observers to examine with the greatest care all the motions of the sun and moon, of the planets and the stars, and to determine exactly the different times of the four seasons; directing their attention more especially to the regularity or irregularity of the motions.

It does not appear that this order was exactly obeyed; for, during many centuries which followed, the Chinese believed that the equinoxes and the solstices divided the year into four equal parts. He sent Hi-tchong to the East to observe what star is found at the position of the spring equinox; also Hi-chou to the South, to note the star at the summer solstice; and Ho-tchong to the West, to find the star at the autumnal equinox; and Ho-chou to the North, to see the star at the winter solstice. His pliant astronomers found, as might have been expected, a star at each of the cardinal points. But surely it was not necessary to disperse them for these four observations, which a single person might have made on one and the same spot. If the whole is not a fable, the striking similarity of the names belonging to the four learned men is not a little remarkable.

The Chinese divide the circle into $365\frac{1}{4}°$, corresponding to their year of $365\frac{1}{4}$ days. The sun (the

motion of which was supposed to be uniform) must therefore have described one of their degrees every day. They thought that he moved slower than the heavens, and that his retardation was one degree daily. The Greeks had the same notion, but much later, which was opposed by Ptolemy. A like reason was employed to explain the retardation of the moon, so that the common lunar year consisted of $354\frac{548}{940}$ days. In following out these calculations, they found a period of 4617 years, which gave an entire number of revolutions of the sun and moon without a remainder. Here, then, was a long period, the result of calculation and not of observation; this is what all nations have done.

In the year 2285, B. C., the Emperor Chun, fearing that his astronomers, Hi and Ho, neglected their duty, called them to his presence, and commanded them to construct a machine which should represent the concavity of the heavens divided into degrees, having the earth in its centre, and the sun, the moon, and planets, in their proper places; the whole to move in such a way as to show at every instant the exact aspect of the celestial bodies. Moreover, he directed that these philosophers should be furnished from his treasury with precious stones of different colours, to mark the poles, and represent the sun, the moon, and planets. The stars were to be shown by pearls. But the figure which Mailla gives of this machine exhibits none of these wonders. It is simply an armillary sphere, in which no planets are seen. The only thing remarkable is the extreme narrowness of the zodiac, which might, indeed, represent the ecliptic.

In the year 2159, B. C., the astronomers, Hi and

Ho (probably the descendants of those before mentioned, or it may be these were official names attached to the function of astronomer), holding the office of governors of provinces, are said to have neglected their duty as mathematicians of the empire; and being immersed in debauchery and drunkenness, and thinking only of their pleasures, they failed to inform the Emperor Tchong-kang of an eclipse of the sun which should happen in that year. He, justly indignant at their conduct, sent his general, at the head of his troops, to punish them. In a speech to his soldiers, the commander expatiated on the enormity of the crime committed by the men of science, and declared it to be the established law, that whether the time of the happening of a celestial phenomenon was not accurately predicted, or not predicted at all, in either case the punishment of such negligence should be death without remission! Accordingly, under this statute, the unfortunate astronomers perished. It must be confessed, that the imperial anger lay too heavy on Hi and Ho, who had no idea either of the inequalities of the sun and moon, or of the effect of the geographical position of a place combined with the moon's altitude (which is called parallax) on the time and duration of an eclipse of the sun. This law, if ever it existed, was never executed but on this one occasion; and as there must have been many erroneous predictions, it is wonderful that, being considered as unpardonable crimes, such punishments were not more frequent. It may be feared that the negligence of Hi and Ho was only a state-pretext for visiting them with vengeance for the more palpable offence of favouring rebels. The translator of the Annals, in his

preface, cites this eclipse, and the execution of the astronomers, as an irrefragable proof of the antiquity of the Chinese, and the certainty of the epoch when Tchong-kang reigned; but Delambre has properly observed, that, to give this evidence any degree of value, the actual happening of the eclipse ought to have been somewhat better ascertained. Chronologists are not agreed as to the year it occurred. The Annals date it in 2159; other works in 2128: Father Gaubil believed that it might be proved to have taken place in 2155, and, in support of his opinion, has quoted those of three other Jesuits. But if the liberty of changing it four years more or less be allowed, it will not be difficult to find some small eclipse during so long a period. To induce us to believe firmly that it happened, other proofs are wanting besides those given in this particular case. A failure to predict an eclipse happened long after in the case of the astronomer Tchou-kong, who has left a greater reputation than Hi and Ho; though these last certainly did not deserve death for an oversight which it was not in their power to avoid. Considering, however, all circumstances, it seems very probable that the negligence of these functionaries, in regard to the eclipse of 2159, or 2155, B. C., and their cruel punishment, are merely a fiction.

There is no mention in the Annals either of astronomy or of eclipses, from the year 2159 to the year 776, B. C. It would seem that the fate of Hi and Ho, if real, had given the Chinese a distaste for a science so perilous; but at the commencement of the last moon of the latter year there happened an obscuration of the sun. From this period there is in the Annals a continued record of 460 eclipses, of

which the first two are those of 2159 or 2155, and 776, B. C. The last was in 1699 of the Christian era. The record gives merely the dates of these phenomena, without any indication either of the hour, duration, or quantity; and without these they can hardly be of any use in astronomy. Delambre has collected them into a table in the first volume of his *Astronomie Ancienne;* and he has also given a table of sixty-eight comets, mentioned in the Annals. These, like eclipses, had become objects of attention on account of the terror which they usually produced. The Chinese have no theory of their motions, nor have they given any account of them, except a few words respecting their tails.

Among other celestial phenomena recorded in the Annals, we find these:—

"In the year 74, B. C., there appeared a star as large as the moon, which was followed in its motions by several other stars of the ordinary apparent magnitude.

"In the year 321, A. C., spots were seen on the sun by the simple view.

"In the year 949, A. C., the star Tai-Pe was seen in the daytime (this must have been Venus). Such terror did this phenomenon inspire, that the people were forbidden to look at it: some who had disregarded this prohibition were put to death. (This may give us some idea of the knowledge and the character of the Chinese nation.)

"In 1299, A. C., the tribunal over which Cocheou-king presided predicted an eclipse of two digits, which, however, did not happen. Fears were entertained for the tribunal; but it justified itself

by citing ten examples of like incidents since the year 713."

In the year 1629, the calculated time of an eclipse having failed to agree with observation, the assessor of the Board proposed that the Jesuits, Longobardi and Terence, should reform the Astronomy. The missionaries, from that time, formed part of the Institution.

The system of Chinese astronomy was sometimes changed, and it would even seem to have gone out of fashion. This happened in the year 522 of the Christian era, also in the year 892, and again in 956. These alterations, however, required an express order from the emperor. After the introduction of the European method, some intriguers demanded that it should be abolished, and replaced by their own ancient principles; and the Boards, having been consulted, assented to the change. The emperor assembled the leaders of the two adverse schools, and demanded of the natives whether they had not some means of deciding the question scientifically. As they could suggest none, P. Verbiest, the European president of the Association, proposed, as a trial of comparative skill between the two parties, to calculate beforehand what ought to be the length of the shadows of different gnomons on the following day at noon. This proof was ordered, and turned out to the utter confusion of the Chinese, who could not perform the calculation. We may hence judge how eclipses could be predicted by such astronomers, who did not know how to find the sun's declination, or to deduce from it the length of a shadow; in other words, to resolve a case in right-angled

plane triangles. Seeing that this science had made so little progress during a period of 2400 years, in which it was cultivated by men holding official appointments expressly for its improvement, we may easily conclude what it must have been 2159 before the Christian era.

The observation of eclipses is one of the first and most important functions of the Board of Mathematics. It is incumbent on them to inform the emperor of the day and the hour, and the quarter of the heavens in which every one of these is to happen, also its magnitude and duration. This prediction ought to precede the event by some months; and, as the empire is divided into many extensive provinces, it is necessary that the obscuration should be computed for the longitude and latitude of every provincial capital. These observations, as well as a representation of the eclipse, are prepared as public documents, and distributed throughout the imperial dominions, in order that the phenomenon may be witnessed with the prescribed forms.

The ceremonial of observing an eclipse is this:— Some days before it happens, the Board of Rites puts up a placard in large characters on some public place in Pe-king. This, at least, is the modern etiquette, and it may be supposed to have been the same when the Jesuits were in authority. The hour and the minute are here announced, and the quarter of the heavens in which it will be seen (as if it were necessary to mention where the sun will be at a given time of the day!); also the space that the luminary will remain in the shadow, and the moment when it shall come out of it. The mandarins of all orders are summoned to attend in their official dresses, with

the marks of their dignities, in the court where the mathematicians assemble, to await the moment the phenomenon shall take place. Each carries in his hand the tables where the figure and circumstances of the eclipse are described; and at the instant when the sun or moon begins to be obscured, all fall down on their knees and strike the earth with their foreheads. Immediately a frightful noise of drums and cymbals is raised throughout the city. This is the remains of the ancient belief among the populace, that by such clamour and uproar they could help the oppressed orb, and hinder it from being devoured by the celestial dragon. Although the grandees, the men of letters, and all educated persons in these days, know well that eclipses are merely natural events, they continue, nevertheless, to observe the wonted ceremonial; such is the inveterate attachment of the Chinese to their ancient usages. While the mandarins in the court remain prostrate, others in the observatory examine, with all the attention of which they are capable, the beginning, the middle, and the end of the eclipse, comparing what they see with the figure and the predicted circumstances of the phenomenon. Having completed their observations and remarks, they send them sealed to the emperor, who, on his part, has not been less careful to mark the occurrence. The same routine is followed throughout the whole extent of his vast territory.

The distribution of the calendar is another ceremony performed with great pomp and solemnity. It is first presented to his imperial highness, who reads and approves it; astrological predictions are then added; and it is afterwards printed. The great seal of the Board of Mathematics is prefixed to it,

with an imperial edict, which forbids, under pain of death, the printing or sale of any others. The mandarins of this scientific body then convene to present the calendar to the emperor; copies of which on large paper, covered with yellow satin, and enclosed in envelopes of cloth and gold, are carried on a gilded machine; and these are followed by the copies destined for princes, grandees, and other great men. The astronomical mandarins, after having struck their foreheads three times against the ground, deliver to an officer the copy intended for his majesty. The grandees and the mandarins, on their knees, receive theirs; afterwards they assemble, according to their rank, in the great hall, and, on a signal given, prostrate themselves towards the interior part of the palace, to render thanks to the emperor. The calendar is then sent into every province, where it is reprinted. The people purchase it; even the poorest families procure a copy. In short, it is held in such respect, and judged to be of such importance, that to possess one is held as a proof of loyalty; while, on the other hand, to refuse it is regarded as raising the standard of revolt against the head of the government.

Supposing that the Chinese have really paid so much attention to eclipses, it is unfortunate, says Delambre, that of so many observations not a single one remains, and that the missionaries have not been able to procure any, so as to draw some advantage from them; the mere tradition being of no use, since the only circumstance which would have rendered them subservient to the progress of science has been neglected. What shall we think of that legislation, which forbids astronomers to introduce the smallest

change into the science, and yet makes them responsible with their lives for the errors of their theories? To give consistency and probability to the accounts received of the Chinese astronomy, Delambre reasons thus:—The tribunal of mathematics was charged to announce to the people all eclipses, and for this it was requisite to know beforehand the exact days when the new and full moon would happen in the ecliptic. To do this, it was necessary to keep the celestial body constantly in view, and to sound the alarm when the conjunction began, to warn the people *to come to the aid of the suffering luminary.* If the astronomers, by negligence, failed in making known the time, they deserved punishment; and such was the supposed error of Hi and Ho. As to the prohibition of changing the principles sanctioned by the imperial decree, it is reasonable to believe that it applied only to the calendar. But on this subject we are left entirely to conjecture. It is, however, not easy to understand how the Chinese, so rude under Fou-hi, came, in so short a time, to have a Board of Mathematics capable of calculating eclipses of the sun. The same people, at a later period, continued in extreme ignorance during twenty centuries; at the end of which, the most learned among them was unable to calculate the length of the shadow of a gnomon. It has been said that their literature was extinguished at the time when Chi-hoang-ti burnt all their books, in the year 221 before our era. But if their astronomical treatises then perished, how is it to be supposed that the cultivators of that science were not thereby relieved from the fearful responsibility that hung over them? On all these points, Delambre was very in-

credulous; he distrusted the statements of the missionaries; he says, they have told us any thing they pleased, but we need only believe what we can.

In the year 1729, P. Souciet published a work in two volumes 4to, with this title, "*Observations, Mathematical, Astronomical, Geographical, Chronological, and Physical,*" collected from the ancient Chinese books, or recently made in India and China by the Fathers of the Society of Jesuits. The astronomical observations in it were compiled by P. Gaubil, who had carefully studied the language as well as the science of the Chinese and Tartars; and with this view he had carefully examined all the authentic records, calculating and verifying their principal eclipses, and other astronomical observations drawn from the same sources. Of the 460 already mentioned, it appears that he scarcely found a dozen that fell exactly in the year, or in the month or day marked by the authors. He has added four to the catalogue given by Mailla, and, in addition, twenty-one conjunctions of Jupiter. The most ancient eclipse goes back to the year 73, A. C., and the last occurs in 1367. There has, therefore, been found only one eclipse, which can be said to have been truly observed in China at a period earlier than that of Ptolemy, and even that one is doubtful.

According to Souciet, the Chinese records indicate the state of the heavens 120 years B. C., the number and extent of the constellations, and the stars which corresponded to the solstices and equinoxes, *all determined by observation;* also the declinations of the stars, and the distances of the tropics from the two poles.

The Chinese have known the proper motions of

the planets: but they were not acquainted with the motions of the stars earlier than 400 years A. C., that is, nearly 600 years after Hipparchus. They understood nothing of the stations or retrogradations; they made all the heavenly bodies turn round the earth. However, in particular treatises, there are some vestiges of a system which placed the sun in the centre. Thus, their astronomical knowledge is later than that of the Greeks, to whom, indeed, they were in all respects inferior. Their eclipses of the sun are the most ancient, or at least the most numerous, which have come down to us, but their authenticity requires to be established.

They expressed the quality of eclipses, and the ecliptical limits by numbers, more than 120 years B. C. Kégler, president of the Board of Mathematics, had a Chinese chart of the stars made long before the arrival of the Jesuits; and, what is remarkable, in this there are several now only visible by telescopes, and which are accurately laid down. So Gaubil has said; but it would be well to know the particular stars.

It is asserted, that from the time of Yao they knew the intercalation of a day every four years; a fact which, if true, would prove great antiquity, for he lived 2300 years B. C. They knew how to observe the shadows of a gnomon, by which they found with some exactness the height of the pole and the sun's declination. This, however, required merely a graphical operation, for they had no trigonometry. They knew the right ascensions of the stars 200 years B. C. They made the obliquity of the ecliptic 24 Chinese degrees, that is, 23° 39′ 18″, for they divided the circle into $365\frac{1}{4}°$. This obliquity might be more correct

than that of the Greeks, but we know not when it was determined. If they had observed it so well and so long, they ought to have perceived its diminution.

According to the same records, the Chinese have always had notions of astronomy. They possess observations of the solstice and of comets, from 400, B. C., to 1300, A. C., and later. In this respect they have done nearly the same as the Chaldeans; they have observed without theory. But have they borrowed nothing from these last?

Souciet's work contains some eclipses verified by Gaubil and his companions, especially one of the sun in the year 2155, B. C., which was calculated by four Jesuits. They referred it to the year 1865 of the creation. They place the deluge in A. M. 1656; the eclipse was therefore observed 209 years after that catastrophe. This missionary, who asserts that he had established many observations, believed that they were really made, and not merely calculated after the events. He wished to prove the certainty of the Chinese chronology, but Delambre has viewed it with great distrust. It must be admitted, he says, that such observations prove the nation to have been afraid of eclipses, but not that they calculated them.

There are some appulses of Jupiter to the stars recorded in Souciet's book, from the year 73, A. C., down to 1367, A. C. He says the Chinese records contain a great number of these appulses of Jupiter, and the other planets among themselves, as well as the occultations of stars and of planets by planets; also eclipses of the sun and moon, with the times marked, as well as the quantity of the eclipse. These are the observations which he ought to have given, but which he has not taken the pains to transcribe.

In the same work there is a history of astronomy by Gaubil, who says, that books on astronomy are rare in China, and that such as can be obtained are deficient in order and method. All the natives agree, that after the time of the Tchun-tsieou of Confucius (480, B. C.), this science was almost entirely neglected; scarcely any eclipses were either observed or calculated, and by degrees, it is added, the theory and the practice became extinct. Here, again, Delambre was tempted to believe that nothing was lost, and that there was nothing to lose. The oblivion of the methods taught by the ancients, and particularly by the Emperor Yao, for the calculation of the seven planets and the fixed stars, is here also ascribed to Chi-hoang-ti, who caused the historical and literary records, those of astronomy, and the classic book Y-king, to be burned. The Frenchman is quite incredulous on this point, but observes, that where nothing remains, it is just the same to us as if it never had been.

In the year 104, B. C., Sse-ma-tsien composed precepts for computing the motions of the planets, eclipses, and the syzygies; but these have not been given; however, we have those of Hipparchus, which are more ancient. There were then instruments of brass, of which nothing is related, either as to their use or antiquity; it being only specified that they were two feet five inches in diameter. Lo-hia-hong placed a moveable sphere with circles under a large circle, which represented the meridian. He is said to have employed a piece of mechanism to measure the extent of the twenty-eight constellations, and to have referred the motion of the stars to the equator; there being no contrivance by which he could refer them to

the ecliptic. This want would have been no great inconvenience if he had known spherical trigonometry. The Chinese were therefore much less advanced than the Greeks. A gnomon was, at the period of which we are speaking, employed to observe at all times the solar shadows. By means of it meridian lines were traced, and by placing an instrument in the meridian the passages of the stars and the constellations were observed. By using water hour-glasses, the differences of the right ascensions were measured; also the intervals between the rising or setting and the meridian passage; the length of the days; the times the planets rose and set; and, in short, the morning and evening twilights.

In the year 66, B.C., Lieou-hin, having collected the precepts and observations of his father Lieou-hiang, of Sse-ma-tsien, of Lo-hia-hong, and others, and having also examined some ancient observations, composed an entire course of astronomy, to which he gave the name San-song, or *the three principles*. This was a rational proceeding, and to appreciate the worth of his treatise, it is only necessary to know what pains he bestowed on it, and the knowledge it contained.

Lieou-hin supposed the winter solstice to be in the last degree of the constellation Teou; hence it was easy to determine the sun's mean place every day of the year, though the true place required a correction which was then unknown. The year was divided into twenty-four tsieki, and every tsieki into three keou. He supposed the obliquity of the ecliptic to be 24 Chinese degrees. The astronomers knew how to calculate a right-angled triangle, and by this means they could find the sun's meridian altitude and declination every day, and on the day of the

solstice: The height of the gnomon was eight feet, the foot contained ten inches, and the inch ten fans or minutes. From certain observations made in the year 66, B.C., the obliquity of the ecliptic comes out 23° 38′ 52″. According to modern tables, it should have been 23° 43′ 32″; the difference is 4′ 40″ in defect. The Greeks, at the same epoch, made it too great by 8′. If, as they say, the determination was that of Eratosthenes, then it was only 6′, and the errors were nearly alike in quantity, but in opposite directions. At this time the Chinese had no idea of the inequalities in the motions of the sun, or the moon, or the planets. The four seasons were supposed to be perfectly equal. The daily motion of the moon was computed to be $13\frac{7}{19}°$; and the synodic revolution 29·530864 days, or 29d. 12 h. 44m. $26\frac{1}{2}$s. The different phases of that luminary were imagined to depend on its angular distance from the sun; its course, however, was understood to be neither exactly in the equator nor in the ecliptic, but in a path considerably complicated; indeed, it appears that the notions entertained as to the displacement of the lunar orbit were very vague, and much less perfect than those of Hipparchus, who lived about the same time. It was reckoned that the moon makes 254 revolutions while the sun makes nineteen; that 235 conjunctions made 6939 days, and, in addition, seventy-five ke (a ke was the 100th part of a day); this period was called Tchang. It was believed that nineteen common years consisted of 228 months; it was therefore necessary to add seven intercalary months; these were added in the third, sixth, ninth, eleventh, fourteenth, seventeenth, and nineteenth, of the Tchang. There is no epoch assigned for the Tchang.

The imperfection of the cycle of nineteen years was observed; a cycle of 4617 solar years was formed; at the end of which the conjunctions return to the same day, the same point of the heavens, and the same day of the cycle of sixty years. This was, however, not very exact. In the astronomy of Sansong, there was an assumed instant, called Chang-yuen, the primordial epoch; it was that of midnight, when the sun and moon were in conjunction with the five planets in the winter solstice, and the moon without latitude. The Chang-yuen began 143,127 years before the midnight of the winter solstice, and the first of the eleventh moon of the year 104, B. C. This epoch, of course, was fictitious, and not exact. The catalogue of stars gave neither the longitudes, the latitudes, nor the declinations; it gave right ascensions only; no idea was entertained of precession.

Some time before the year 85, A. C., it was shown to the Emperor Tchang-ti, that the error in the lunar conjunctions exceeded a day, while that of the solstice was not less than five. To correct these, the astronomer Li-fang was directed to make a new calendar. By observing the shadow of the gnomon, the obliquity of the ecliptic was found to be 23° 48′ 56″. Here was an increase of 10′ in not more than 151 years. Li-fang imagined the cycle of seventy-six years, the same period as was found in Greece by Calippus. He called it Pou: after a period of twenty pous, that is 1520 years, the conjunctions returned to the same day of the cycle of sixty. He made another period of 4560 years, which, besides, brought the conjunctions to the same year of the cycle of sixty years. At the time of these reforms, as we have said, there was no instrument to observe

the motions referred to the ecliptic; however, in the year 99, A. C., the emperor directed a large one to be made for that purpose. The inequality of the moon's motion was then discovered, and found to vary between from 12° to 15° in the day. But a correction for the difference between the mean and the true motion was not introduced until after the 200th year of the Christian period.

In the year 164, A. C., strangers from the west visited China. It has been supposed that they brought with them some knowledge of the labours of the Alexandrian school; though Ptolemy's Almagest had been composed only about forty-five years before that period. This might seem too short a time for science to reach the empire through such a channel; but immediately after the arrival of these foreigners some facts in astronomy became known, which probably were conveyed by them. Tchang-heng constructed armillary instruments,—a celestial globe and a sphere; a waterfal put the machine in motion,—a bad method. The revolution of the moon was now known as well with regard to the sun as its apogee and its nodes; the length of the year was found to be a little less than $365\frac{1}{4}$ days; but, what is surprising, a catalogue of 2500 stars was made in the 160th year of our era, though without latitudes or declinations. This catalogue is lost. It is most remarkable that, if the stars were reckoned by the eye, it should contain 1500 more than that of Ptolemy, and almost as many as the Britannic catalogue of Flamstead, made by the aid of the telescope. Hence arises considerable doubt as to its authenticity. It is said a tube was used, but without glass in it; at any rate, such an expedient would be useful.

Notwithstanding any foreign aid which the Chinese might receive in forming their astronomy, the science was always in a languishing state. One great cause was, that their doctrines were almost entirely conjectural, and not sufficiently founded on observation. Their authors, instead of examining periods and ancient cycles to discover their defects, endeavoured to find methods of calculation, to form fresh epochs, though it was only to efface them. Whatever was the cause of this, it is certain that, in China, astronomy has always been in the state of an edifice, which is continually destroyed as often as it rises one stage above the ground.

The philosophers Lieou-hong and Tsay-yong, in the year 206 A. C., composed the system called Kien-sang, or the Representation of the Heavens. They were the first that took into account the inequality of the lunar motions, and supposed that it might amount to five Chinese degrees,—a subject on which Ptolemy approached much nearer to the truth. They found that the year was not precisely 365¼ days.

The astronomy of Ouei was composed in 237, A. C., when an attempt was made to determine the length of a degree of the meridian. It was supposed that 1000 ly made a difference of an inch in the shadow of a gnomon of eight feet; but we know neither the length of a ly nor of the foot. In this measure there was an imitation of the Greeks; and they also followed the Chaldeans in their absurd propensity for astrology. It was supposed that there was a connexion between the actions of princes and the motions of the heavenly bodies, so that the one influenced the other. This false principle applied particularly to eclipses, which they did not know how to

calculate. It was believed that at one time—a period of perfection—there were neither eclipses nor retrogradations; and that the misconduct of princes alone had put scientific men to the trouble of calculating these phenomena. At all events, the astronomers of later dynasties agreed in believing, that no certain principles for computing eclipses were known before the time of Lieou-hong.

When an announced eclipse failed to happen, the prince was flattered into the belief that his virtues had prevented a great misfortune; while, if it did take place, he was supposed to be threatened with some calamity. The conjunctions of planets were regarded as a favourable augury for rulers, and were accordingly sometimes inserted in the history of a popular monarch. An eclipse of the sun on the first day of the first moon was held as a happy presage; though it is obvious that, by means of an intercalation, it might be made to fall in the last moon of the year. This account is by no means calculated to inspire confidence in the Chinese astronomy.

The annals already mentioned give a singular example of the importance attached, in the year 31 A. C., to an eclipse which had not been predicted. It produced such terror, that the emperor secluded himself five days to examine into his conduct and that of his administration! Afterwards he published an edict to the following effect:—The appearance of the sun and moon has turned our attention to ourselves. It is necessary that we follow a better course, and thereby avert the evils with which the heavens threaten us. For myself, I can scarcely speak; I tremble at the sight of my errors; I wish that the dignitaries of my court would give me their

advice in sealed writings, and I do not wish that any one should give me the title of *Ching*. His courtiers complied with the command. Gaubil has given the answer of Thing-king, which was that, according to the rules of astronomy, eclipses ought never to appear but on the first day of the moon; though, of late years, several have happened on the last day. The reason is, the moon has accelerated its motion, and by that the time of the eclipse is anticipated. *The sun is the image of the sovereign, the moon the image of the subjects. The imperfections of the latter have usually their source in those of the former.* This shows what a powerful instrument superstition is; though it has seldom been applied to so useful a purpose as the reformation of a government.

The astronomy of Han and of Ouei was succeeded by that of Tsin, which, however, did not give either the latitudes or declinations of the stars. Kiang-ki, charged with this labour, made the draconitic month, or revolution of the moon from node to node, to be 27·321613 days. Its mean period, however, is 27·212222 days; and from this calculation we may judge of the accuracy of the rest. He made, indeed, one important improvement; it was that of determining the true place of the sun by means of eclipses of the moon,—a method which Hipparchus had invented 200 years before.

About the same time, the astronomer Yu-hi first spoke positively of the motion of the fixed stars, which he found to be a degree in fifty years, or 72′ in the year. It is, in fact, about 50″. Hitherto the shadow of the gnomon was observed only on the day of the reputed solstice, and Ho-tching-tsien was the first to observe it for several days in succession. In

this way he found that, at Nan-king, in the year 442 A. C., the winter solstice happened on 20th December, at 2h. 32′ in the morning. The author of this improved method of observing had conferred with an Indian bonze, from whom he probably learnt it; and the science was, in other respects, improved by the same industrious student.

Before the year 550, there was no rule for the moon's parallax, nor any clear directions for finding the beginning, the middle, or end of an eclipse; while the precepts for the quantity were by no means exact. At the same period Tchang-tse-tsin gave rules on these points. He also introduced, for the first time, equations into the motions of the planets, and gave formulas for reducing the places of the moon to the ecliptic, and for calculating the reduction of the ecliptic to the equator. It is said that, about the year 584, the motion of the stars was a degree in seventy-five years.

In the year 721 A. C., a predicted eclipse having failed, the bonze Y-hang was called to court; who, wishing to know the situation of the principal places in the empire, had gnomons, spheres, astrolabes, and quadrants, constructed for this purpose. He despatched one party of mathematicians to the north, and another to the south, with instructions to observe the altitude of the sun and of the polestar every day: the terrestrial arcs were also measured. He sent others to ascertain the length of the days and nights at Cochin-China and Tonquin, and the principal stars which were not visible above the horizon of Singan-fou. At this time Canopus is spoken of in the Chinese astronomy. In comparing the several altitudes of the pole then determined with those after-

wards found by the missionaries, there are differences of 6′, 34′, 1′, and 17′. A degree of latitude was said to be 351 ly and eighty paces, though the Jesuits found it to be only 200 ly; but the value of the ly must have varied. The polestar was reckoned to be 3° from the pole.

Y-hang was wrong in his computation of the precession: in fact the Chinese were continually changing their system, but always without success. He made a planetarium which struck the hours; the latitude of Sirius was imagined to be forty of their degrees; his error was in fact 7′, and the round number 40° makes it still more liable to doubt. He suffered a considerable mortification in the non-appearance of two eclipses which he had predicted. The customary preparations were made, and ceremonials performed in vain; but he maintained that his calculation was correct, and that the disappointment must have been occasioned by the altered motion of the heavens; instancing an occultation of Sirius by Venus as a like change. He prepared a treatise on astronomy, and soon afterwards died in his forty-fifth year.

In the year 806, there is mention of a chariot that showed the south, which was no doubt the magnet-compass applied to land-travelling. In the course of the same century, Su-gang explained distinctly the parallax of longitude and its use in eclipses; and Pien-kang composed a treatise on these phenomena, which was in substance the method of Y-hang. He also made a catalogue of the stars, assigning their latitudes and longitudes, and was the earliest author who spoke of a first meridian for astronomical calculations. He had a plan for determining the lati-

tudes of the five planets, and he employed some equations for their motion. It is doubtful whether Su-gang and Pien-kang were natives of China; their writings are certainly not in the style of that nation.

The principal events connected with this science, between the years 1000 and 1200 A. C., were a treatise on its doctrines; a new calendar,—the old one having led to failures in predicted eclipses; the observation of the variation of the magnetic-needle from the meridian; a new determination of the obliquity of the ecliptic, viz. 23° 21′, and also of the precession; it being found, that in 3361 years, the stars had advanced 42½°, that is, about a degree in seventy-nine years. Zingis Khan and his successors brought into use the astronomy of Yeliu-tchoutsai, of which the following were important elements:—

	Days.
The Solar year,	365·243594
— Synodic month,	29·534608
— Anomalistic month,	27·554608
— Draconitic month,	27·212224

The philosopher Co-cheou-king, who became president of the Board of Mathematics between the years 1200 and 1300, discharged its duties not less than seventy years, during which he somewhat advanced the science. He abolished the use of fictitious epochs, and also introduced a gnomon of forty feet for determining the solstice. During a period of 1500 years, the length of the gnomon was always eight feet,—a remarkable instance of the adherence of the Chinese to long-established practice, as well as of their indifference to improvement. He examined the instruments of Song and Kin, and finding them defective to the extent of 4° or 5°, he made new ones. He calculated the famous eclipse of Tchong-kong

(that for which Hi and Ho suffered), and discovered that it happened in 2128, B. C. He sent mathematicians to different places to determine their latitudes by the polestar. The results differed sometimes $\frac{1}{2}$ and sometimes $\frac{1}{4}$ degree from those given by the Jesuits. He found the obliquity to be 23° 33′ 40″, which was pretty correct, compared with former calculations, but computed erroneously that the north star was three degrees from the pole. He appears to have been the first of his countrymen who knew spherical trigonometry; though his methods were very intricate. He is said to have measured to the accuracy of minutes the distances of the stars, by means of an instrument, the precise nature of which is not explained farther than that it was a tube and two threads. Before his time, it was known in general that the proportion of the circumference of a circle to the diameter was that of three to one. This, it appears, was the limit of Chinese knowledge. It is not ascertained how Co-cheou-king acquired his method, or whether he had learnt it from the foreign mathematicians who were at court.

Co-cheou-king was twice in error in his calculation of eclipses of the sun, and this was noticed at court; though after his death astronomy was greatly neglected in China. It revived in 1374,—an epoch in which the philosopher Ta-tong appeared. Then it was supposed that the stars advanced a degree in seventy-two, seventy-one, or even in seventy years. Mohammedans were at that time introduced into the Board of Mathematics, under whose auspices the shades of ignorance became gradually darker.

About the year 1573, the science was in a wretched state, when the prince Tching and the as-

tronomer Hing-y-lou undertook to re-establish it. They explained the doctrine of eclipses, and computed most of those found in the Chinese records; examining the ancient methods, and distinguishing the good from the bad. Their works are the best the natives have on the subject. While Hing-y-lou was labouring with ardour, the European astronomy became known, and was so much esteemed at court, that the care of the Board of Mathematics was confided to the Jesuits.

At different times the Chinese received communications which may have seduced them into imperfect notions. They were visited in 164, A. C., by strangers, who professed to be sent by Gan-tun, king of Ta-tsin (Egypt or Arabia). The two astronomies were compared. In the books of the bonzes there were methods for eclipses of the sun and moon; these came from India. The astronomy of the kingdom of Niépolo, to the west of Thibet, was known. One of the priests taught the people the names of the Zodiac, the Ram, the Bull, &c.

Among the Chinese, *lo-keou* is the moon's ascending node; *ki-tou* the descending node: the same name occurs in the Indian astronomy: *po* is the greatest height of the moon or the limit. These terms were introduced into China by Christians in 629, and at that era the circle was divided into 360°, and the degree into 60′.

There is a third volume of the work compiled by the missionary Gaubil, to whose labours we owe our principal knowledge of the Chinese astronomy; the first book of which is merely a notice of the ancient treatises, the Y-king, the Shoo-king, the Tchun-tsieou, and some others; also certain details

on the right-angled triangle, the sides of which are three, four, and five; on the square of the hypotenuse of a right-angled triangle; and on the parallelogram, as divided by the diagonal into two equal triangles. It was in these that the geometry of the Chinese consisted, though we are uncertain whether they knew how to demonstrate the theorems. The conclusion which may be drawn from this part of Gaubil's work is, that the nation is nearly as ancient as the epoch of the Deluge, and that their notions of astronomy have ever been very vague and fanciful. In the second part, he treats of the same subject during the interval from 206, B. C. to 1400, A. C. This contains various tables for comparing and reducing the time and space involved in their calculations to those of Europe. In reckoning time, the day was divided into 100 *ke*, each ke consisted of 100 *fen*; so that it contained 10,000 *fen*, or minutes,—a number expressed by the character *van*. To find more easily the equations of the moon, the entire time of the anomaly is divided into 336 parts, one-seventh of which is forty-eight; the interval from perigee to perigee, also from apogee to apogee, contained 168 parts.

Between the anomalistic revolution and the synodic revolution, the difference was 1 d. 9759′ 93″. The moon's motion between the conjunction and opposition was 182° 62′ 87½″.

The following table exhibits at one view the progress of a branch of the Chinese astronomy, and its slow approximation to truth:—

TABLE OF THE DURATION OF THE YEAR AND THE LUNAR MONTHS AT DIFFERENT EPOCHS.

Years.	Solar Years.	Synodic Months.	Anomalistic Months.	Draconitic Months.	Dynasties.
104 B. C.	365·25· 0· 0	29·53·8·64		27·32· 0· 0	
66 B. C.	25· 0· 0	8·64		32· 0· 0	Han.
85 A. C.	25· 0· 0	8·51		32·18· 0	
206 A. C.	24·61·80	5·40	27·55·53·59	32·15·64	
237	24·68·80	5·98	45· 5	32·16·17	Ouei, Chinese.
284	24·68·38	5·95	45·10	32·16·13	Tsin.
443	60·71	5·85	45·21	32·16· 0	First called Song.
463	28·14	5·91	46·87	21·22· 3	
521	31·29	5·29	47·14	21·44·32	Ouei, Tartars.
540	41·87	6· 4	45· 5	21·45· 6	
550	45· 9	5·99	46·42	21·22·55	Tsi, Northern.
604	45·43	5·95	45·73	21·17·55	Soui.
608	30·34	5·94	45·52	21·22·69	
618	46·11	6· 1	45·43	21·23· 5	Tang.
665	47· 0	5·97	45· 4	21·22·21	
724	44· 7	5·92	46· 1	21·22·10	
822	46· 2	5·95	45·46	21·22· 2	
892	45·51	5·93	45· 9	21·22· 2	
1001	45·54	5·94	45·56	21·22· 0	Song.
1064	35·89	5· 9	46· 0	21·22· 0	
1271	39·35	5·93	45·31	21·22· 3	
1280	25· 0	5·93	46· 0	21·22·24	Yuen, Tartars.
Present European Astronomy,	365·24·22·22	29·53·0·59	27·55·55·46	27· 2·22·22	

Gaubil has given a table (the 27th) of the sun's place for every day of the year, divided into four parts, viz.: from the winter solstice to the spring equinox, next to the summer solstice, then to the autumnal equinox, and again to the winter solstice. The diurnal motions were reckoned to be in Chinese degrees,—

At the Winter solstice,.....1·050503
Vernal equinox,.....1·001161
Summer solstice,.....0·951516
Autumnal equinox,.....0·999110

These tables required that the instant of the solstice should be determined; therefore they could not have the same accuracy for any length of time. There is a table (the 29th) of the latitudes of the moon. The greatest is from 6° 2′ to 5° 55′.

It was a most extraordinary assumption in this astronomy, that the moon's angular motion was slowest when she was nearest the earth, and fastest when most remote;—the reverse of the truth. In fact, all their tables are entirely empirical. The precession of the equinoxes, as has been already noticed, was estimated very differently at different times, varying between from 50 to 180 years to a degree. The Chinese appear never to have had any fixed rule for determining eclipses; while their precepts were so obscure that they could not be fully comprehended by the Jesuits. In this field of research they were far behind the Greeks at the same period. In the end, they abandoned their own methods, and adopted those of the Europeans,—a sure proof that the former were of no importance.

The observations of the planets made by the Chinese consisted in the number of days they were retrograde, or direct, or stationary, and the angular space in the heavens they described in these intervals of time. Their conclusions were, however, too uncertain and rude to be of any value.

On the whole, their astronomy, as explained by Gaubil, contains only the most vague notions, and has no precepts which could be of any use, or throw the least light on the science. Indeed, it may be confidently said, that its true principles were never established in China, notwithstanding the very long period during which it was cultivated by a succession of learned men supported by the state.

Gaubil has ended his account of it by unfolding a long series of eclipses, many of which are erroneous; and it is impossible to say whether they are the result of calculation or of observation. Delambre has

inserted them in his outline, but without giving any encouragement to hope that they will ever be found of material use.

The *Connaissance des Temps* for 1809 contains an extract from a manuscript, sent in 1734 to Mr Delisle by the same Gaubil, which records twenty-nine solstices determined or observed by the natives. But they afford no basis for calculation: They are followed by observations of meridian shadows of gnomons at different places. The first of these was made about 1100, B. C. The noonday shadow of a gnomon of eight feet was then ascertained to be 1·5 feet at the summer solstice, and 13 feet at that of winter. The round numbers induce a belief that they were obtained in a very rude way; but had the observations been deserving of confidence, they would have been valuable for settling the annual diminution of the obliquity of the ecliptic, as they bear date 800 years before the time of Eratosthenes. The obliquity found from these notices comes out 23° 54′ 24½″; but by similar trials, made 50, B. C., the obliquity was 23° 53′ 57″. The interval is not less than 1050 years, and the difference between the obliquities not so much as 1′, yet it ought to have been 8′. This is a proof that neither can be depended on. It could hardly be expected that the length of the shadow was fixed to the accuracy of half an inch; a quantity so inconsiderable, as to have produced a variation of not more than eight minutes in the latitude of the place of observation, and fourteen minutes in the obliquity.

Delambre has discussed ten of these observations, without drawing from them any satisfactory result; and he concludes his history of their astro-

nomy by saying, " It unfortunately results from this examination, that no certain information can be drawn from the long labours of the Chinese. It appears that, in the year 206, A. C., the error of their instruments amounted to five degrees. Co-cheou-king, in 1280, erred to the extent of a degree and a half in the declination of the polestar. Previous to the time of Ho-tching-tsien, in 442, no shadow had been determined on the day of the solstice. In 629, Lit-chang-fong showed no confidence in the observations of the shadows made before him. Even those of Co-cheou-king were not taken nearer than 4, 12, and 15 days of the true solstice. It also appears that these meridian shadows lead to nothing but uncertain and discordant results; and, farther, that the Chinese might have obtained their astronomical knowledge from the Mohammedans or the Indians, and that at last it was entirely supplanted by that of the European missionaries." Indeed, the first of these were instructed in the school of the Greeks.

We have not thought it necessary to enter into any detail of the present state of astronomy in China, because, in point of fact, the Europeans are the sole depositaries of the science in that country in modern times. They construct the calendar and predict eclipses; availing themselves of the aid of our Nautical Almanac, which, in one instance, they had the good fortune to obtain for some years in advance, from one of our British embassies. It may be presumed that such a treasure was duly appreciated, and that means would be taken to secure a regular supply in future of such an important aid in satisfying the astronomical wants of this singular people.

GEOLOGY AND MINERALOGY.

CHAPTER V.

Geology and Mineralogy of China.

Scarcity of Materials—Southern Mountains—Granite—Mei-ling Mountain and Plain—Mountain of the Five Horses' Heads—Peninsula of Shan-tung—Banks of the Yang-tse-kiang and Po-yang Lake—Leu-shan Mountains—Ladrones—Metals—Gold, Silver—Precious Stones—Yu—Mercury—Coal—Natron—Earthquakes—Volcanic Phenomena—Mineral Springs—Fossil Remains.

It would be difficult to name a region including a more ample field than China for the researches of the geologist. Both of those mighty ranges,—the loftiest on the globe,—which from west to east traverse Central Asia, cover a considerable part of its surface. They do not, indeed, present within the limits of the empire their greatest degree of height, nor peaks covered with eternal snow; but they are nevertheless very elevated, and composed, it is probable, of similar materials. Metallic and mineral productions are also peculiarly abundant and varied. Yet it is mortifying to reflect, that there is scarcely a country which has contributed so little to this invaluable branch of knowledge. There are in Europe numerous individuals who would with pleasure examine its mountains from one extremity to the other; but, as long as the mandate of the Li-pou board shall continue supreme, we can scarcely hope that any part of its interesting scenery will be rendered

accessible to scientific research. Plants and animals are brought down to Canton by the natives, who even make a trade of gratifying the liberal curiosity of Europeans; but the geological structure of the country can only be ascertained by minute personal investigation. The opportunities of doing so have not only been few, but have generally fallen to the lot of individuals who possessed no adequate acquaintance with this important branch of natural history. Still it will not be uninteresting to bring into one view the different notices on this subject, which lie scattered through the writings of missionaries and travellers.

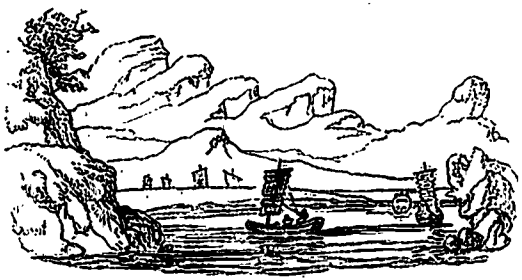
The most prominent feature of China, considered in a geological aspect, is that southern range, the continuation of the Himmalehs, which we have already traced through its whole extent as far as the ocean. There is the best reason to presume that, as in the other great chains of the Old World, the basis consists of granite; though this fact has only been ascertained with regard to that portion which is crossed by the great road from Pe-king to Canton.* That rock, however, seldom appears on the surface, being almost entirely covered by limestone in varied forms, and by huge masses of sandstone. It is only where the rivers, in forcing a channel for their waters, have worn away the superincumbent strata, that this and the other primitive rocks are exposed to view. It was in such circumstances that Mr Abel, who accompanied the embassy under Lord Amherst as chief medical officer and naturalist, was enabled to observe the granite in the bed of the Kan-kiang; and, higher up, a dark-coloured compact schistus resembling the killas of Cornwall; both of them

* Staunton, vol. iii. p. 343.

covered by red sandstone, which is the prevailing deposite on the banks of the river. The lofty heights surrounding Nan-ngan-fou were too distant from the route of the mission to be ascended; but the cliffs in the immediate neighbourhood of that city were found to be composed of slate, having a very close texture and dark-gray colour, and arranged in horizontal strata.* The loftiest pinnacle of the Mei-ling mountain, through which the road is cut, was observed to consist of argillaceous sandstone of a compact structure, small-grained, and lying in distinct strata parallel to the horizon. On the southern side of this elevated peak, limestone-rocks predominate, shooting up in the wildest and most fantastic forms. The plain immediately beneath presents a most extraordinary scene,—"rocks piled on rocks, as if by magic spell,"—enormous blocks rising above each other in castellated and pyramidal shapes. The material is a very fine granular limestone, approaching to the compact; the surface of which, by the action of the elements, has been rendered vesicular, presenting in some parts a very grotesque appearance.† Farther down, on the banks of the Pe-kiang, there occurred an extensive formation of breccia, and above it were beds of ferruginous clay, formed by the disintegration of the rock, which gave a remarkably red colour to the soil. It was succeeded by argillaceous sandstone resting on puddingstone, in which were observed rounded fragments of quartz and decomposed crystals of felspar.‡ At a still lower level were seen immense masses of

* Abel's Narrative of a Journey in the Interior of China, &c. (4to, London, 1818), p. 180-2. Ellis' Journal, vol. ii. pp. 86, 99, 136.
† Abel, pp. 184, 185. Ellis' Journal, vol. ii. p. 149.
‡ Abel, pp. 190, 191.

limestone, which, contrasted with very high and smooth sandstone-hills, threw over the face of the country a wild aspect. Among the striking features of this region, the mountain called the Five Horses' Heads, of which a representation is here given, at-



Five Horses' Heads.

tracts the notice of every traveller.* Near Tchang-tcheou-fou the rocks are principally red sandstone, amidst which coal frequently rises to the surface, and is extensively wrought. From this town to Canton, beds of limestone, which in one place is that described as the grayish-black variety, assigned by Werner to the transition series, and a fine-grained argillaceous sandstone of a grayish-yellow colour, line the banks of the river.† We are informed by an intelligent friend, that on the shores of the Bocca Tigris, below the city just named, the prevailing formation is still granite and sandstone.

* Abel, p. 193. Nieuhof, in Pinkerton, vol. vii. p. 241. Staunton, vol. iii. p. 347.—This View, quite different from that given by Nieuhof, is from an original drawing in the Macartney Collection.

† Abel, pp. 194, 198. Staunton, vol. iii. p. 347. Ellis, vol. ii. pp. 158 162, 165.

The great chain, after passing the province of Quang-tung, turns to the northward and forms the western boundary of Tche-kiang. The river Tsien-tang-kiang flows between its ranges, which rise in many places higher than any mountain in Great Britain. The granite is here exposed to view in large masses, and is employed in paving the streets of Hang-tcheou-fou. The summit was crossed at one point by Lord Macartney and his suite; the road being bordered by a number of hills of a conical figure, so regular as to appear the result of art. They consisted of blue coarse-grained limestone. Beyond were quarries, whence was dug quartz in its purest state, beautifully white and shining, which is used by the natives in the manufacture of porcelain.*

The large peninsula of Shan-tung is traversed by a high chain of mountains completely insulated, being bounded either by the sea or by the extensive alluvial plain of Central China. They are said to consist in a great measure of a naked and perpendicular mass of granite.†

Although the metropolitan province of Pe-chelee is, for the greater part, extremely level, its northern tracts form the declivity of a chain which, in Tartary, attains the height of about 15,000 feet. The loftiest summits are formed of granite, which often appears in those sharp-pointed peaks, called in the Alps *aiguilles* or needles. The lowest stratum is composed of sandstone; above is a coarse-grained blue limestone; then an irregular and very thick layer of indurated clay, sometimes of a bluish, at others of a brown-red colour. Near the frontier are

* Staunton, vol. iii. pp. 287, 305. † Ibid. vol. ii. p. 88.

perpendicular veins of white, or, in some places, blue and white spar. In the Great Wall, the foundations of the towers, and other parts requiring much strength, are built of granite, which is gray and contains little mica. In Tartary, beyond that rampart, the same rock is seen in huge masses arranged somewhat like the vertebræ of a quadruped.*

As Lord Amherst pursued his journey by the Yang-tse-kiang and the Po-yang lake, Mr Abel had an opportunity of making some observations on the geology of the hills and islands with which they are diversified. The banks of the river near Nan-king present an extensive formation of a gray compact limestone, with which the walls of that city are built; whilst higher up, near Tong-ling-hien, they are flanked by a deposite of fine micaceous sand. Close to the village there appeared puddingstone, above which was a bed of red gravel; then a dyke of solid rock several feet thick: and over all another layer of red gravel.† The numerous islands in the stream and lake, richly crowned with verdure and pagodas, consist chiefly of a conglomerate of round and angular fragments of quartz, limestone, and felspar-porphyry, sometimes united by a very thin argillaceous cement, at others embedded in sandstone. The Leu-shan Mountains, near the junction of the stream with the lake, exhibit a small-grained granite, containing milk-white felspar, smoke-gray quartz, and grayish-black mica; also a micaceous schistus, presenting a very small portion of quartz, and in some places garnets. In the same spot were found large crystals of felspar.‡

* Staunton, vol. ii. pp. 356, 357, 380; vol. iii. p. 6-8.
† Abel, p. 161. Ellis, vol. ii. p. 44.
‡ Abel, pp. 171, 172. Ellis, vol. ii. pp. 70, 73, 74.

The group of small islands called the Ladrones, off the southern coast of China, are almost wholly composed of a rock which, according to Sir George Staunton, consists of a mixture of clay, oxide of iron in a small proportion, and much siliceous earth and mica. Mr Abel, who carefully examined one of them called Hong-kong, on which was a hill 1500 feet high, describes it as consisting of basaltic trap, partly exhibiting a distinct stratification, partly a confused columnar arrangement. A small islet, separated from it by a narrow channel, and not rising more than forty feet above the level of the sea, is composed entirely of granite and basalt. Their junction, it is remarked, exhibits a curious fact: On the north side of the island, where the phenomenon is most obvious, it is occasioned by a dyke of basalt passing upwards through the granite, and spreading over it. This dyke rises from a body of basalt, which stretches beneath the granite in a north-westerly direction, and vanishes below the surface of the sea. It is not in immediate contact with the granite, but is separated from it by three narrow veins, which interpose between them and follow the dyke through its whole extent. The width of each of these veins does not exceed four inches,—that of the basaltic dyke is as many feet. The veins are of three kinds,—1*st*, A compound of granite and basalt, mixed together in an indeterminate and confused manner; 2*d*, Pure felspar; and, 3*d*, A sort of porphyry, composed of very perfect crystals of felspar in a basaltic base. The veins of pure felspar and of porphyry were separated with ease from each other, and from the neighbouring rocks; but the felspar and basalt, in mass, which was intimately

combined with the basaltic dyke, could only be separated from it by great force. "Near the line of junction of the granite with the basalt," says the Doctor, "I found masses of the latter embedded in the former."*

The western provinces, as already remarked, are also pervaded by extensive ranges of mountains, which appear to be prolongations of the great chains of Eastern Tartary,—the Kwan-lun and the Teen-shan. No observations, however, have been made upon their structure, either beyond the boundaries of the empire or within its limits.

There seems no doubt that China is one of the richest countries in the world in metallic productions,—yielding, not only iron, copper, and lead, but also gold, silver, mercury, tin, and zinc. Platina, it is said, has not yet been found. This variety of metals is probably owing to the number of mountain-chains by which the continent is intersected. The abundance, too, of these valuable substances is amply proved by their being supplied in sufficient quantity for the vast population, with only a limited importation of some of them from abroad.† But of their precise localities, the nature of the ores containing them, and the processes by which they are extracted, only the most vague and unsatisfactory accounts have been obtained. It is chiefly in the western districts bordering on Tartary, which have never been examined by any scientific European, that these mineral treasures are lodged.

* Abel, p. 62. As the phenomenon here described is of rare occurrence, we have adhered to the words of the learned author. Portions of granite embedded in basalt present themselves much more commonly to the eye of the geologist.

† Staunton, vol. iii. p. 380, *et seq.*

Gold is collected in the sands of rivers in Yun-nan and Se-tchuen, and copious mines of it are said to exist in these provinces and in Hou-quang; but the working of them is understood to be prohibited, unless on a very limited scale and for the benefit of the government. The few specimens procured are described as being pale, soft, and ductile. It is not used as a medium of exchange, and is even little wrought into ornaments. The chief demand is for leaf, gilding, and embroidery, for which the moderate quantity produced is amply sufficient.*

Silver is said to be found in those parts of the grand mountain-range which traverse Koei-tcheou and Quang-see, and in Yun-nan mines of it are always open.† The working of them, too, is represented as being likewise to a great extent prohibited by the government; yet this metal is abundant, and circulates throughout the empire in pieces which are stamped, though not coined. A large amount, indeed, was long received from the European merchants,—the Chinese refusing to accept any other commodity in exchange for their exports. Since the introduction of opium, however, a balance in silver, amounting to upwards of £1,000,000 sterling, has been paid to the British, and appears to have been procured without difficulty. Iron occurs in most of the mountainous provinces, particularly Shan-see, Se-tchuen, and Fo-kien; while copper abounds in Yun-nan and Koei-tcheou.‡ The petung and gong-metal are not particular species, but combinations of this with other metals. The cala-

* Du Halde, vol. i. pp. 22, 257, 204-207. Staunton, vol. iii. p. 381.
† Du Halde, vol. i. pp. 252, 264, 25.
‡ Ibid. vol. i. pp. 223, 232, 163, 257, 265.

mine, from which zinc is extracted in a very pure state, is noticed chiefly in Hou-quang; lead in Se-tchuen and Fo-kien; tin in Hou-quang;* but the quantity of this last not being sufficient for the large demand, the manufacturers are obliged to draw an additional supply from the islands of Banca and Borneo.

China does not abound in precious stones. The diamond is unknown. Rubies and sapphires are procured from Yun-nan; though it is suspected that these, as well as other gems, are imported thither from Ava. But the subjects of the Celestial Empire, having a taste of their own in every thing, regard certain coloured stones as more valuable than the ruby and the diamond. Among these, the highest rank is decidedly given to those termed *Yu*. According to Cibot, "in that world of precious trifles which the Chinese and Tartar ladies twine in their hair" it holds the chief place. These stones are rare in the country itself, the finest being found in Yun-nan; and, in truth, the greater number are brought from Ele and other districts in Tartary. Cibot is convinced that he has seen *yus* lying as neglected pebbles in the beds of rivers descending from some parts of the Alps and Pyrenees, and thinks that any one who should collect and carry them to China would make a large profit. They have been known in Europe under the name of *jade*, and classed as nephrite; but Professor Jameson has found reason to refer them to the mineral species which by Werner is denominated *prehnite*. They are sometimes found, as already stated, in the beds of torrents, and not unfrequently in the declivities

* Du Halde, vol. i. pp. 205, 232, 163.

of mountains, mixed with earth and stones. They are valued particularly according to their colours; the favourite tints, as we are informed by one of the missionaries, being the various shades of green, sky-blue, and milk-white; while, according to Mr Abel, a greenish-white is the most esteemed. Those of a uniform colour are preferred; yet the shaded and marbled bear also a certain price. Cibot admits that the yu presents nothing brilliant, but, nevertheless, reflects a light extremely soft and pleasing; Abel, on the other hand, could see nothing whatever to justify the prodigious admiration in which it is held. It is sonorous, heavy, hard, yet brittle; and though it is on that account peculiarly difficult to cut, the Chinese take pride in fashioning it into various shapes, such as cups, saucers, bracelet-clasps, buckles, and even animals. Some of these articles require the labour of nine or ten years; but nothing can exhaust the patience of the Yu-tsiang, or workers in yu. Our author saw a small vase of which the handle was in the form of a lizard, and the sides adorned with numerous representations of the same reptile. The gem presented by the emperor to Lord Macartney was of this stone, worked in the form of a sceptre. The veneration for it is very great; and the native historians assert that it was known and prized many centuries before the Christian era.*

* Mémoires concernant les Chinois, tome xiii. p. 390-395; tome vi. p. 257-260. Abel's Journey, p. 132-134. Jameson's Mineralogy (2d edition), vol. i. p. 505, note. Mr Abel gives the following as its distinctive characters:—"Its colour is greenish-white, passing into grayish-green and dark grass-green. Internally, it is scarcely glimmering. Its fracture is splintery: splinters white. It is semi-transparent and cloudy. It scratches glass strongly, and is not

The Chinese possess the agalmatholite, or figure-stone, which, from its softness, is easily cut into any form with a knife. They frequently carve it, as well as the realgar or sulphuret of arsenic, into figures of men, pagodas, cups, and other fanciful objects, which are often brought to this country as curiosities.* This seems to have suggested to them the practice of carving in stone,—an art which they apply to the hardest and most untractable materials. They possess also the lapis-lazuli,† from which the ultramarine blue, so much esteemed by painters, is prepared. Considerable quantities are said to be imported from the island of Hai-nan into Canton, where it is employed in the embellishment of their porcelain.‡

Mercury is in very great demand throughout China, being used both in medicine and the arts. From its active qualities it is said to have formed a principal ingredient in the liquor of immortality, where its incautious introduction might be one cause of the dreadful consequences arising from these draughts. In the form of cinnabar, it occurs copiously in Shen-see and other provinces. It is divided into stone-cinnabar, found in the hollows of rocks; earth-cinnabar, drawn from mines; and water-cinnabar, obtained in the bottom of wells after the fluid has been drained off. The people separate it into

scratched by, or scratches, rock-crystal. Before the blow-pipe, it is infusible without addition.

"*Specific gravity.*

"1. Whitish-green, marbled with dark-green variety,.....3·33
2. Dark-green variety,.....3·19
3. Whitish green variety, off the same specimen as No. 1. 3·4
4. Light-coloured greenish-white variety,.....2·858."

* Jameson's Mineralogy (2d edition), vol. i. p. 501.

† Du Halde, vol. i. pp. 223, 232, 257.

‡ Jameson's Mineralogy (2d edition), vol. i. p. 339.

various species, according to its colour, and even the form in which it occurs, such as pea, ball, or grain. Tradition encourages the belief that mercury was anciently found in a pure state, superseding the necessity of extracting it from this ore. There are also some notices of a phosphorescent cinnabar, which is said to have shone in the dark; but Cibot could not obtain any specimens of this remarkable production.*

Among minerals, one cannot hesitate in giving the first place to coal,—the great abundance of which throughout the empire is doubtless one chief cause of its prosperity. The mountains in the province of Shan-see and the western parts of Pe-che-lee are said to be remarkably rich in this valuable commodity.† Collas distinguishes three kinds used at Pe-king; one fitted for furnaces alone, which, though it requires to be blown into flame by bellows, burns very brightly; the other two, called *ing-mei* and *joan-mei*,—hard and soft coal,—are adapted for domestic use, and are peculiarly free from smell. Mr Abel saw a variety in the province of Pe-che-lee, which he considered as a species of graphite; while that on the Yang-tse-kiang resembled the cannel; and a third kind, found south of the Po-yang lake, is called *kovey*. What appears on the banks of the Pe-kiang, in the province of Quang-tung, contains much sulphur, and is employed in the manufacture of sulphate of iron, from hepatic iron pyrites.‡ The

* Du Halde, vol. i. pp. 226, 254, 264. Mémoires, tome xi. p. 306-313.

† Humboldt, Fragmens Asiatiques, tome i. p. 215.

‡ Du Halde, vol. i. p. 22. Mémoires, tome xi. p. 334-351. Abel, p. 194.

same writer observed a species of striated gypsum exposed for sale in large quantities, but could not learn whence it was procured. It forms a favourite medicine amongst the inhabitants.*

A variety of natron, which the Chinese call *kien*, is found in the country to the north of Pe-king. It occurs on the surface of the ground, and is cleared from the earth by first dissolving it in water, and then evaporating it to dryness. A solution of it is used for washing; and it is also employed in the manufacture of soap, which, however, according to Collas, is not nearly so good as that of Europe. Alum is familiar to the people under the name of *pe-fan*, and is exported in considerable quantities: they are also acquainted with sal-ammoniac as *nao-cha;* and with several kinds of vitriol,—the green, or sulphate of iron, as *hei-fan;* the blue, or sulphate of copper, as *tan-fan;* and the white, or sulphate of zinc, as *hoang-fan*.† Nitre was long supposed to be produced only in China, and the sovereigns of the Ming dynasty therefore prohibited its exportation; but the enlightened mind of Kang-hi, having become aware of this error, removed the restriction. At present a considerable quantity of this substance is clandestinely introduced into the empire every year. Culinary salt (muriate of soda) is procured in abundance from the sea, ponds, and wells; but rock-salt is wanting.‡

China is to a considerable extent visited by earthquakes, which some of the native authors, according

* Abel, p. 219. Ellis, vol. ii. p. 118.

† Mémoires, tome xi. pp. 315, 329-332. M'Culloch's Dictionary of Commerce, p. 26.

‡ Mémoires, tome iv. pp. 454, 463, 466.

to their favourite cosmogony, ascribe to the occasional renewal of the ancient conflict between the demons of the earth and air. The north-western provinces and the coast of Fo-kien are the chief seats of these commotions. Ten years, it is said, seldom elapse without one of these attacks, which are sometimes so violent as to cause the Yang-tse-kiang to overflow its banks; yet we do not find any mention of the destruction of cities or the loss of lives. At Tai-ouang, on the coast, shocks are represented as occurring almost every month.*

Volcanic action, so extensive in the interior ranges of the Teen-shan, appears to be very limited within the proper boundaries of the empire. Writers under the Song dynasty mention a mountain in Yun-nan which vomited fire; but its eruptions have so long ceased, that many in the present day doubt their having ever existed. Hollows, however, are said to be still observed at a place called Tou-tcheou, from which flames issue at certain intervals.†

The mountain of Py-kia-shan, or, as it is sometimes called, from the abundance of yu found in it, Yu-shan, in Se-tchuen, probably contains fires of a volcanic nature. During the night, the flame from its eastern side colours the tops of the surrounding eminences, and even the sky, with a bright red, and throws upon the neighbouring forests all the distinctness of day. The wild country in which this peak is situated, amidst summits covered with perpetual snows, and the fierce character of its inhabitants, who yield but an imperfect obedience to the laws of the Celestial Empire, prevent all research into

* Mémoires, tome iv. pp. 456, 457.
† Ibid. p. 475.

the true nature of these appearances. At Ou-tcheou-fou, in Quang-see, there is a hill from which every third or fifth night flames are seen to issue; and in Shan-see, near the boundaries of Tartary, several mountains presenting similar phenomena have been observed.* Of the same volcanic origin are, probably, those remarkable Ho-tsing or Wells of Fire, in the province of Se-tchuen, which have been described by M. Imbert, a French missionary in that country. These apertures, which resemble Artesian springs, are sunk in the solid rock, generally to a depth of 1500 or 1800 feet, and in one instance to 3000, whilst their breadth does not exceed five or six inches. This is a work of great difficulty, and requires in some cases the labour of two or three years. The water procured from them contains a fifth and sometimes a fourth part of salt, which is very acrid, and mixed with much nitre. When a lighted torch is applied to the mouth of some of them, whence there is no flow of water, fire is produced with great violence, and a noise like thunder, bursting out into a flame twenty or thirty feet high, and which cannot be extinguished without great danger and expense. The gas has a strong smell of bitumen, and burns with a bluish flame and a quantity of thick black smoke. When confined in tubes of bamboo, it is conducted under boilers, and employed in evaporating the salt-water from the other springs.†

Mineral wells are represented as abundant and much frequented; but few details are given of their situation or properties. Many of them are reported

* Humboldt, Fragmens Asiatiques, tome i. p. 209-215.
† Ibid. tome i. p. 196-207.

to contain sulphur, and others iron. The sulphureous one of Hong-chan, near the Yellow River, is said to be reddened in spring by an infusion of cinnabar; while another at Hing-tcheou is impregnated with alum.* Others of a similar nature are also described as being found in Pe-che-lee; and in Shan-see there are many hot fountains, the waters of which differ in colour and taste, according to the various substances held in solution.†

It seems impossible to determine to what extent fossil remains would be found in China. The alluvial soil deposited on the banks of the Pei-ho is very abundant in shells. Mention is made of the Hei-tong-kiang, a petrifying river in Yun-nan, by the action of which, wood, insects, fishes, the horns of animals, and the bones of men, are completely converted into stone.‡

* Humboldt, Fragmens Asiatiques, tome iv. p. 467.
† Gairdner on Thermal Springs, p. 160. Staunton, vol. ii. p. 352. Du Halde, vol. i. pp. 223, 225. Mémoires, tome xi. p. 307.
‡ Ibid. tome iv. p. 454. Abel, p. 79.

BOTANY

CHAPTER VI.

General View of Chinese Botany.

Introductory Remarks—Meagre Sources of Information—Native Works—Impediments to the Advance of Botany in China—Loss of Abel's Collections by the Wreck of the Alceste—Contributions of the Older Travellers—Modern Researches—Collections made by Naturalists attached to the several European Embassies—Drawings in Possession of the East India Company—Collections made by Mr Reeves at Canton and Macao—Collections in the Museum of the Royal College of Physicians, London—Chinese Horticulture—Gardening.

Of the Botany of China, using the term in its proper sense, very little is known in this country. The native treatises and herbals which have come to our hands, whether we regard the illustrative figures or the descriptive text, are among the most astonishing specimens to be met with of the "palpable obscure." We are bewildered among crowds of figures and multitudes of words; figures of which we more than doubt the resemblance to any thing in nature; and words, which we suspect to be rather a veil for ignorance than a garb for knowledge. We admire, indeed, the unwearied industry of the draughtsman, notwithstanding the abuse of his skill; and we cannot but respect the mental labours of the physician, though the absurdity of his doctrines, and the perversion of intellect, are rendered ma-

nifest in all his precepts. At this point of commendation, however, low as it is, our praise must cease; and it is succeeded by regret, that the one should have employed his willing pencil to distort nature, and that the other should have devoted his ready pen to disguise knowledge. A European statesman once ventured to make the paradoxical assertion, that language was given to man to conceal his thoughts. However this may be, the Chinese philosophers have certainly succeeded in employing it, if not to conceal their thoughts, at least to conceal the truth; and the artists are too prone to emulate their example, by attempting to improve on nature, and, accordingly, instead of accurate likenesses, they give fancy sketches, or such at least as, from their numerous variations, may be considered rather as original designs than faithful portraits.

The Chinese *Pun-tsaou* and *Pun-tsaou-pe-yaou*, copies of which, through the kindness of our friends, Dr Watson, and Mr Reeves, late a resident for upwards of seventeen years at Canton, are now lying before us, fully bear out the statements we have made; and this will be evident from the extracts we shall introduce in a subsequent part of these observations. The first of the works just mentioned, the Pun-tsaou, consists of seven volumes, containing, on the whole, one thousand one hundred and eleven *misrepresentations* of plants, animals, and minerals, used medicinally in China; and the latter, the Pun-tsaou-pe-yaou, if we may not declare it an admirable specimen of learned ignorance, is most certainly a striking instance of a case where too much learning has made man mad.

With both these works we have been surprised,

and with both we confess we have been much entertained, but by neither of them have we been materially instructed. In them we seek in vain for records of actual observations; there are none; the marvellous supersedes the true;—we ask for information, and are supplied with tales of wonder;—we toil through pages in search of facts, but find only vague speculation. Nor is this deficiency supplied in the volumes of European writers on China. The notices of plants, scattered incidentally through the memoirs of the Jesuits, are so meagre and unsatisfactory as rather to obscure than to enlighten the subject, and the information to be met with in the works of later travellers is only sufficient to make us regret that their means were so limited. When political impediments to the entrance of strangers were few, and they were even permitted to reside in the empire, no advantage was taken of the opportunities afforded them; indeed, natural science was then scarcely advanced enough in Europe to create any desire for such knowledge. Since foreigners have been excluded with a jealous care, the embassies, which from time to time have been sent from this part of the world, have formed almost the only means of gaining any acquaintance with the natural productions of that vast country; and from these visits, few and confined as they have been, naturalists have profited but little. Ambassadors, and the persons officially attached to them, have been in general far too much engaged with their political and commercial duties to bestow sufficient time or thought on natural history. In their journals of daily occurrences, they tell us, incidentally, what fruits and vegetables they saw in the streets or

markets, and give us the Chinese names of such as were brought to table; but they have seldom told us any thing more. Once, indeed, the prospect seemed to open; but the hope then cherished only served to render the subsequent disappointment more severe. When, on the mission of Lord Amherst, Mr Abel, who was attached to his lordship's suite as principal medical attendant, was also, at the suggestion of Sir Joseph Banks, appointed naturalist to the embassy, and liberally supplied by the East India Company with the means of successfully prosecuting his researches, it was reasonably expected that much would be learned of the vegetable productions of a country hitherto unexplored. And these expectations were all but realized. The collections made were extensive, and would appear to have been most valuable; for to those immediately made by himself, his assistants, and fellow-travellers, others of great importance were added by several friends to science; but when the Alceste was wrecked the whole were lost. The extent of this loss we know not, but that it was one of no trifling kind may be gathered from Abel's lamentation. He describes it as consisting of "materials which would have afforded extensive scientific communication with China;" and, among other things, of "300 packages of seeds, many of which were taken from plants of undescribed genera, and by far the greater number from unknown species." Indeed, as he well observes, "with such facilities (as he possessed) it would have been strange, even in countries often trodden by scientific men, if I had not gleaned some new and important facts. But in China, scarcely touched by the foot of the naturalist, nothing short

of a rich harvest could have been received as a token of my due exertions. The proofs of what these were, of their efficiency or abortiveness, are buried in the Straits of Gaspar."*

Such being a general statement of our knowledge of Chinese plants, and of the chief public sources whence information may be derived, it cannot be expected that the claims of science should be fully answered. But we are not altogether destitute of materials for the chapter on which we have entered; for the Travels of Marco Polo, the writings of the Jesuits, the History of China by Du Halde and Barnardine, the journals of the Dutch and British embassies, as well as those of various individual travellers, although chiefly engrossed by other matters, contain here and there scattered notices of natural history. Among these are certain details respecting its general vegetation, and descriptions of the more remarkable native plants; and, although supplying very scanty materials, still they afford some actual information, of which it is our purpose to avail ourselves to the full extent.

In the first place, several interesting accounts relating to the agriculture and horticulture of China are to be found in these various works; and hence we occasionally learn what plants are under cultivation by the farmer and the gardener in the different provinces. Several of the esculent fruits and vegetables

* The loss of these seeds was attended with very provoking circumstances; for, as Abel adds in a note, "after leaving the wreck of the Alceste, I had the mortification of hearing that the cases containing the seeds had been brought upon deck, and emptied of their contents by one of the seamen, to make room for some linen of one of the gentlemen of the embassy." Throw away three hundred packages of Chinese seeds to make room for a *gentleman's* linen! Proh Pudor!

are likewise mentioned, and some of the medicinal ones have also been described. These memorials, indeed, are meagre; but of non-dietetic and non-medicinal plants the notices are still more scanty. Some few, however, occur in the lists made out by the person who accompanied Lord Macartney, and these are published in Sir George Staunton's work; but the lists are short, and must be very imperfect memoranda of the plants found in the several districts through which the embassy was conducted. Similar catalogues are also given by Abel in his work; and Loureiro likewise, in his "Flora of Cochin-China," has mentioned all the plants with which he was acquainted. And, secondly, added to these sources of information, there are several unpublished and private records, of no slight importance; for there are in the possession of the East India Company two large folio volumes, containing nearly 400 figures (many of them, however, being duplicates) of native plants, chiefly those which are ornamental or used as food. In the museum of the College of Physicians there is likewise a collection of Chinese *materia medica*, including many officinal plants, some of which are in a recognisable condition; and, above all, our friend Mr Reeves has a valuable series of upwards of 500 botanical drawings, besides an extensive collection belonging to other departments of natural history. These last are peculiarly important; for Mr R., during his long residence at Canton and Macao, had drawings made by native artists of all the plants he could obtain, and he very properly had them executed under his own eye, in order to check, as much as possible, the tendency of the

draughtsmen to deviate from fidelity. To all these we have had free access, and we cannot refrain from tendering our warmest thanks to Mr Reeves, and to Dr Watson, the Professor of Materia Medica, and curator of that department in the College of Physicians, as well as to Sir Charles Wilkins, and Dr Horsfield, of the East India House, for their exceeding kindness and liberality.

Of the industry and rural economy of the Chinese some account has already been given in the second volume of this Work, Chapter IV. We may however observe, that the commerce and manufactures of China being comparatively insignificant, agriculture there assumes an imposing character; and, as it is the most general employment of the people, it seems to have been the policy of the government to render it not only the most important, but also the most honourable occupation.

Notwithstanding all these encouragements, however, the agriculture of China is far inferior to that of most European states. A Scotch or a Sussex farmer would think it contemptible. Few persons cultivate more than is sufficient to support their families and pay their taxes; indeed, the small allotments of land which belong to each individual, must preclude any extensive operations from being attempted; and this system, at the same time, often prevents the accommodation of the crops to the soil; as each, on his little plot, grows all the variety of food he wants: thus most of them cultivate their own corn, their own sugar, their own tobacco.

The spade and the hoe compete with the plough, and often supersede its use: indeed the Chinese

plough is scarcely deserving of the name, and is only fitted for land where there is no sward to cut. In one thing, however, they seem to have anticipated us. Corn is almost universally sown in drills, or dibbled; for the "sowing broad-cast has been found by them not only to be attended with a considerable loss of seed, but also with a diminution of crop; for, when such a method is pursued, the straws are apt to grow in some spots in clusters, while in others the ground is scarcely covered. And Sir George Staunton says, that a gentleman attached to Lord Macartney's embassy calculated the *saving* of seed alone in China by the drill husbandry, which would be lost in that of broad-cast, would be sufficient to maintain all the European subjects of Great Britain!"

But the Chinese know nothing of the principle of assolements, or the varied succession which, by a scientific alternation, relieve the ground and augment the produce; for, although their crops are occasionally changed, the variation is evidently fortuitous, as they alternate *wheat and other grains* with rice. Abel, indeed, observes, that he often found "millet on the borders of the river, and not a hundred yards beyond, the *Sida* or Chinese hemp-plant, and still further the *Gossypium* or cotton, and then a barren marsh;" but, he continues, "this variation had no fixed law, except with respect to the millet, which always lined the banks of the river when not of a sandy nature. In this mode of cultivation the Chinese had shown some ingenuity and industry; but I could never find here, or elsewhere, that they throw extensive tracts of land into cultivation, still less

that they modify its surface by any complicated process of a durable result. In short," he concludes, " whatever observations I have been able to make on the state of their land, lead me to the conclusion that, ' as horticulturists, they may perhaps be allowed a considerable share of merit, but on the great scale of agriculture they are not to be mentioned with many European nations.' They may ' excel in obtaining abundant products from land naturally fertile, but they are much behind other nations in the arts of improving that which is naturally steril.' "

The horticulture of the Chinese has, in general, more of a useful than an ornamental cast. Their pleasure-grounds are few, and it is in the kitchen-garden they excel; for, although considerable skill is displayed in the culture of flowers, there is often more skill than good taste, and it is to the growth of culinary vegetables that their attention is chiefly turned. The very raptures in which their poets indulge, with respect to gardens and flowers, afford indirect proof of their rarity, although they have often led to a belief in the surpassing beauty of their parterres and the superiority of their floriculture. The royal gardens of Zhe-hol, and the Woo-yuen or Five Gardens, once attached to an imperial residence, as well as the Yuen-min-yuen or Gardens of Gardens, as they have been *par excellence* called by the natives, have indeed been described in glowing terms by several European travellers; but whenever any particular details have been given, either of these or of the grounds belonging to the emperor's palaces, they are shown to be any thing but very fine places.

After journeying, as Abel says he did on leaving

Ta-cou, "through an uninterrupted flat of 200 miles, remarkable neither for its productions nor its cultivation;" we cannot wonder that the wearied eye "beheld unusual charms in hills, trees, and flowers," of whatever kind or wherever met with. Of the success of the Chinese in forming ornamental ground, the celebrated Woo-yuen, just mentioned, may be given as an example. These gardens were described by De Guignes, and his account has been confirmed by some of Lord Amherst's attendants, as covering a large space, "part of which was filled with pavilions either grouped or isolated, and communicating together by an infinite number of corridors and smaller buildings. These were all in a ruined state; the roofs were fallen in, and the window-frames and floors were rotten. One apartment alone contained any thing to interest curiosity. In this a pedestal of white marble supported a slab inscribed with a sentence composed by the Emperor Kien-long. A serpentine river had once meandered through the gardens; but its bed alone remained. The remains of several bridges still existed, one of which had been of a curved form. Factitious rocks of grotesque shapes, the delight of the Chinese, were scattered about in all directions. These gardens, when in perfection, must have exhibited *a good example of Chinese pleasure-grounds.*" The training and clipping trees and shrubs into the forms of various animals,—a fashion now happily extinct in Europe,—is still very prevalent in their horticulture: and these distorted shrubs, as well as the dwarfed oaks and firs, and other forest-trees, which are such especial favourites, that "specimens are to be found in every

considerable dwelling," are in exact accordance with the foregoing details. For, in these deformed productions, art has perverted nature instead of assisting her; and however curious such cripples may be, and however captivating at first sight from their novelty, they still are monsters, and repugnant to good taste.

The dwarfing or stunting forest-trees is a device peculiar to China, and its success is reckoned a test of the gardener's skill. The art consists in forcing the branches of various trees to throw out roots at one or two feet from their extremities by twisting, or wounding them, and applying a ball of compost round a node. The branch is then tortured into a variety of forms according to the taste of the artist, to give it an appearance of decrepitude, and smeared over with treacle to attract insects, which erode the bark, cause a premature decay, and give a fictitious character of age. These diseased and distorted plants are then set in pots or frames, and "the surface of the soil interspersed with small heaps of stones, which, in proportion to the adjoining dwarfs, might be called rocks. These are honey-combed and moss-grown as if untouched for ages," and are intended to maintain the illusion, and to give an antique appearance to the whole. An excuse, however, has been suggested with reference to this absurd custom; for, as Staunton observes, "besides the mere merit of overcoming a difficulty, it has that also of introducing plants into common apartments, from which their natural size must otherwise exclude them;" and, in places where garden-ground is chiefly devoted to the culture of culinary vegetables, it does admit of a still more

urgent plea; for, when not introduced into their houses, the Chinese, as we learn from Abel, "appear to have confined the attempts at ornament to their yards," in which he found growing various ornamental plants; such as, *Begonia Evansiana, Lagerstræmia Indica, Hemerocallis Japonica, Cassia sophora, Nerium oleander, Lychnis coronata, Tradescantia cristata,* which, with an undetermined species of *Dianella,* of *Hibiscus,* and *Plumbago,* and *Dwarfed Pomegranates,* were abundantly cultivated in pots. The elegant *Ipomœa quamoclit* is also trained on small frames of trellis-work, and this, from its frequent appearance, is obviously a favourite, although not to be compared to the beautiful peony, and the *Nelumbium speciosum* or superb *lien-wha.*

The *Pœonia Mou-tan* is much esteemed by the Chinese; indeed their gardeners claim the merit of converting it from an herbaceous plant to the condition of a shrub. They have several varieties of exceeding beauty; but the yellow-blossomed one, the *Pœonia arborescens lutea,* is by far the rarest and most highly prized. In fact, its existence was for a long while doubted by Europeans; but in the East India Company's collection of drawings there is a figure of it, taken, as Mr Kerr affirms, from a living plant in one of the mandarins' houses at Canton, in the spring of 1810. The mou-tans will not bear the heat of that city, and hence they are annually brought to it in immense quantities from the north, generally arriving, says Mr Kerr, about the beginning of February. The plants are carried in large baskets, in which they are placed close together in an upright position, without any mould about their

roots, and only occasionally sprinkled with water to keep them alive. On being received they are planted in large pots to blow, which they do in a short time; but they never flower at Canton after the first season: a few sometimes survive the hot weather, though in such an exhausted state as never again to flower, and consequently they are thrown away. There are other ornamental plants more or less cultivated; such as, the double jasmine and almond, *air-plants*, roses, oleanders, and similar shrubs; but these will be hereafter mentioned.

The nursery-gardens afford another means of judging of the taste of the Chinese in horticultural affairs; and those at Fa-tee, situated on the southern bank of the river about three miles above Canton, are in much repute for their rare and beautiful plants. But Abel tells us, that although the expectations raised by the high praise of the natives were not entirely disappointed, still he found that "plants, remarkable for their dazzling colours and singular forms, were more cultivated than those of great rarity."

The Chinese can boast of many excellent edible fruits, some of which, as the *li-tchi*, the *lon-gan*, the *tse-tse*, the *ye-ou*, the *quang-lae*, and the *wang-pee*, are peculiarly their own; and others, such as walnuts, chestnuts, pine-seeds, apples, pears, quinces, plums, pomegranates, grapes, cherries, peaches, apricots, water and other melons, oranges, lemons, citrons, shaddocks, they enjoy in common with other nations. These are more or less plentiful in different provinces, but do not seem to be cultivated with any especial care. Indeed, if we may judge from the small number of varieties which

they possess of any of those fruits, particularly of such as are common to China and Europe, their skill in the management of the orchard and fruit-garden cannot be estimated highly. They have indeed their strange fingered lemon or citron, the celebrated *phat-thu*, and a most delightful orange called the mandarin; but they have only three or four kinds of apples, and seven or eight of pears, and as many of peaches, whilst we have about a hundred varieties of peach, nearly seven hundred varieties of pear, and between one and two thousand cultivated varieties of apple. Of the capability of their native fruits for improvement we know nothing, but with that of the foregoing we are familiar, although something must be allowed for climate; yet it is on all hands admitted, that their apples and pears are bad, and their peaches and plums very indifferent.

To the above must be added the *mango* and *pine-apple*, the *cashew*, *betel*, and *cocoa nuts*; the *service*, and the fruits of *Taxus nucifera*, *Salisburia adiantifolia*, of *Rhamnus zizyphus*, which latter are called dates; the peduncle of *Hovenia dulcis*, and the seed-vessels of *Hibiscus ochra*, which taste very like the white of an egg.

Their list of pot-herbs, and of other dietetic vegetables, is much more extensive than that of either their flowers or fruits; for the necessity of augmenting in every way the supplies of food for so dense a population has led to the domestication of many plants, which elsewhere are neglected, or only met with in a wild state. Such, for example, as the shepherd's purse, which the gentlemen of the Macartney embassy saw brought to table as a

salad; a cultivated *momordica* forms a substitute for the cucumber; and a kind of thistle is eaten as a relish with rice. "There cannot, indeed," adds Staunton, "be said to be a useless weed in China;" for "there is scarcely a vegetable growing in the empire of which the different uses in the economy of life have not been found out by trials, or accidentally observed in the course of ages by the natives, so as to have enabled them to have succedanea among themselves for the articles which otherwise it would be necessary to procure from foreign countries. Thus, for example, they use the seeds of a species of *Fagara* by way of pepper; the *tse-tse* supplies the place of the fig; the *Canarium Pimela* of the olive; the *sesanqua* affords a culinary oil, and oil is also expressed from the seeds of sesamum, of hemp, of cotton, of turnip, and a variety of other plants; even the seeds of the *Ricinus* are considered eatable, and castor-oil is not used as a medicine but as food. They manufacture cloth from the fibres of a dead nettle, and paper from the bark of many vegetables, as well as from the fibres of hemp and the straw of rice. They extract from the *Carthamus* their finest red, very seldom using carmine. From the leaves of a *Polygonum* they make a blue dye resembling indigo, and from those of a *Colutea* an excellent green dye. The cup of the acorn serves them to dye black, and in some places the leaves of the ash are made to answer for those of the mulberry in the rearing of silkworms.

Perhaps the *lien-wha*, or *Nelumbium speciosum*, the sacred bean of the Egyptians, is one of the most extensively-cultivated vegetables in China; and, although beautiful, it is there grown for use rather

than ornament. Between the Yellow Wall of the imperial palace of Pe-king and the northern buildings of the city there is a lake of some extent, which, when Staunton was there, was almost entirely overspread with the splendid leaves and gorgeous blossoms of this plant; and the lakes, ponds, canals, and bogs, are almost every where prepared for its production. At one place we read of several hundred acres of swamp being covered with *lien-wha*, and wherever travellers have penetrated, they have found this plant rendering marshes otherwise barren not less beautiful than useful. Its seeds are much relished as food; they are about the size of an acorn, and have a more delicate flavour than an almond. The root-stakes, or *Rhizomata*, are also sliced, and in summer served up with ice, while for winter use they are laid up in salt and vinegar; they are not unpleasant, but in general too fibrous to be much relished by Europeans. *Scirpus* (*Elœocharis*) *tuberosus* is also extensively cultivated in marshy grounds, as well as the tuberiferous *Alisma;* and the *Trapa bicornis* renders even the bottom of the ponds and ditches fertile. Of this they have two varieties,—the red-fruited and the green. But the *pe-tsai*, or *white herb*, is more generally grown, and raised in greater quantities than any other dietetic vegetable. It is a variety of cabbage, and has a delicate flavour, something resembling that of a coss-lettuce. This *white herb* is much relished by foreigners as well as natives, and vast tracts of ground are planted with it every where in the neighbourhood of populous cities,—especially in the northern provinces, where it seems to thrive the best, and where it is salted for winter consumption; in this state it is often

carried southward to be exchanged for rice, to which, when mixed with it, it gives a relish. Staunton says, that when at Pe-king and Hang-tcheou-fou, it was sometimes difficult to pass on a morning through the crowds of wheelbarrows and hundreds of carts loaded with the *pe-tsai*, which were going into those cities. Du Halde observes, that the quantities of this plant sown are almost incredible, and that, "in the months of October and November, the nine gates of Pe-king are embarrassed with the wagons laden with it." Celery, yams, carrots, turnips, with (*Arachis hypogœa*) the earth-nut, common beans, and kidney-beans, as well as a species of *Dolichos* resembling the latter in taste, but of which the pods are from one to two feet long, are also cultivated, and likewise different kinds of gourd; but the melon tribes are not easily grown. The young subterranean shoots of the sugar-cane and bamboo are cut while tender, and eaten as asparagus, —the egg-plant, *Convolvulus serpens*, as a substitute for spinach. Some varieties of radish, onions, leeks, shalots, and garlic, are abundant in every garden. *Capsicums* are also grown as spice, and basil as a condiment, and a species of *Sium*, which has to Europeans an offensive odour, is chopped up and eaten as parsley. Like many other nations who use little animal food, these strong-tasted vegetables are much esteemed by the Chinese, and eaten to excess. Indeed, Abel says, that two official persons who intruded themselves on him, and whose persons were not the most cleanly, threw off from their bodies a most disagreeable odour, in part attributable to their use of garlic. Other esculent substances are grown, some of which will be mentioned hereafter, for the

meaner sort of people, who, living on little else than vegetable food, and being often scarcely able to get enough of that to satisfy the cravings of nature, are not very nice in their selection. The care they take of their little gardens is, however, deserving of the highest commendation. No sooner has one thing passed off, than another is sown or planted, or crops previously introduced are ready to come forward, insomuch that the ground is never suffered to lie still. They even hasten the production of the cabbages, by raising them from slips instead of seed; and much ingenuity is displayed in their various devices to procure a quick succession. It is indeed to this department of horticulture that their attention is chiefly turned, and in which they principally excel; and it is to the enrichment of their kitchen-gardens that they devote the greater part of their most potent manure.

The preceding details show the valuable aid which the records of agriculture and horticulture give to the systematic botanist; and to medicine, another collateral science, we are indebted for still further information,—the medical plants forming also an important series, known to us simply on account of their use in pharmacy. It might hence have been expected, that some notice should be taken of the state of Chinese medicine; and were there, as in the foregoing branches, any interesting facts to detail, such an account might have proved not unacceptable. Medicine, however, at least as far as we can judge of it from the works which have fallen into our hands, is in such a state, that we should incur blame were we to take any farther notice of medical plants than to add them to our systematic catalogues. This per-

haps will be rendered sufficiently obvious by the following extracts from the E-TSUNG KING-KAN, or *Chinese Imperial Medical Work*, and the PUN-TSAOU-PE-YAOU, which treats of Chinese medicine:—

"All medicines that are *sour* are considered to belong to the element *wood*, and affect the *liver*; the *bitter* to the element *fire*, which enters the *heart*; the *sweet* to the element *earth*, which enters the *stomach*; the *acid* or *pungent* to the element *metal*, which acts on the *lungs*; and the *salt* to the element *water*, which affects the *kidneys*.

"All medicines that are *green* are considered to belong to the element *wood*, and operate on the *liver*; the *red* belong to *fire*, and operate on the *heart*; the *yellow* to *earth*, and operate on the *stomach*; the *white* belong to *metal*, and operate on the *lungs*; and *black* medicines belong to *water*, and operate on the *kidneys*. This is the doctrine of the five colours in nature.

"All sour medicines are capable of impeding and retaining; bitter medicines of causing looseness and warmth, as well as hardening; sweet possess the qualities of strengthening, of harmonizing, and of warming; acids disperse, prove emollient, and go in an athwart direction; salt medicines possess the properties of descending; those substances that are hard and tasteless open the orifices of the body, and promote a discharge. This explains the use of the five tastes.

"All medicines, on account of their properties, that are cold, hot, warm, and cooling, are said to belong to the YANG, or *male energy* in nature; while their tastes, as sour, bitter, sweet, acid, and salt, are considered as belonging to the YIN or *female energy* in

nature. Those whose properties are *hou* (strong) partake of the *yang* principle; while those whose properties are *po* (slight) partake of *yin*.

"Those medicines which are light and pure ascend the system, and, being buoyant, are called *yang;* while those that are heavy and thick descend, and are called *yin*. The *yang* principle issues forth by the upper orifices of the body, while the *yin* by the lower. The pure *yang* principle is beneficial to the four extremities; while the thick *yin* reverts to the *six-foo* (the viscera and stomach?). These are the received notions of the *yin* and *yang* principles.

"All light hollow medicines are known to ascend and float in the system, while the solid and heavy sink and descend. Medicines of a slight taste are known to ascend and produce,—this resembles vegetation in spring; while those whose properties are thin, descend the system, but retain,—this resembles autumn; those whose properties are thick, float and are lasting,—this resembles summer; while those whose taste is thick, descend and lie concealed,—this resembles winter; those of a mild taste cause transformations, and bring to perfection, —this resembles the earth as to its power on the vegetable kingdom. Medicines with thick properties, of a slight taste, ascend and float; while those whose taste is thick, but which possess slight properties, descend. Those whose properties and taste are both thick, are capable of floating and descending; while those whose properties and taste are both slight, are capable of ascending and descending. The sour and salt medicines do not ascend, neither do the sweet and acid descend. The cold do not float, nor do the hot sink. These are the doc-

trines of ascending and descending, of floating and sinking.

"Of all roots that are produced, the upper half of what grows in the earth is known to possess the property of ascending the system, while the lower half has that of descending. As to the power of branches, they medically extend to the limbs of the body. The peel or bark has influence over the flesh and skin; the heart (pith) and substance of the tree within the trunk operate on the viscera. That which possesses *light* properties ascends, and enters the regions of the heart and lungs; while the heavy descends, and enters the regions of the liver and kidneys. That which is hollow promotes perspiration; that which is solid internally attacks the internal part of the system; that which is hot, but decayed, enters the breath; that which is mollifying enters the blood-vessels. Thus the upper and lower, the internal and the external, parts of medicinal plants have each their correspondent effects on the human system."

These samples of the learning of China will plead our apology for not making any more extracts, either from the *Pun-tsaou-pe-yaou*, or the *E-tsung-king-kan*. This last, as its name imports, is the "*Chinese Imperial Medical Work*;" and is so called, because its revision and republication were undertaken by the physicians of the Royal College, in obedience to an imperial edict. They also may perhaps be sufficient to justify the opinion we hazarded at the commencement of this chapter; notwithstanding, these "physicians of the Royal College" assure the emperor, that, by intrusting them

with the reform of the healing art, he showed his "benevolence to be great,—as vast as the heavens, —for by this act," they declare that "he conferred longevity on a thousand ages."

From such mines little valuable ore could be extracted, however sedulously the labour might be carried on. We shall therefore close the works without further comment, after having added to our lists the recognisable plants which they contain.

CHAPTER VII.

Fragments towards a Flora of China, being a Catalogue of Chinese Plants, arranged according to the Artificial System of Linnæus.

MONANDRIA.

MONOGYNIA.

Canna Indica. C. Chinensis (vel pedunculata). C. patens.
Curcuma pallida. C. longa.
Kæmpferia rotunda. K. galanga.
Zinziber officinale.
Amomum globosum.
Alpinia media (?). A. nutans. A. calcarata. A penicillata. A. galanga. A. diffusa. A. bracteata.
Phyllodes placentaria (*Lour.*)
Costus (? speciosus).
Salomonia Cantoniensis (*Lour.*)
Garcia nutans.
Salicornia.
Philydrum lanuginosum.
Boerhaavia diffusa.
Chloranthus inconspicuus. C. monostachys. C. monander.
Morella rubra.
Hellenia Chinensis. H. abnormis.

DIGYNIA.

Corispermum hyssopifolium.
Blitum.

DIANDRIA.

MONOGYNIA.

Jasminum officinale. J. hirsutum. J. undulatum. J. paniculatum. J. arborescens.

Nyctanthes arbor tristis.
Veronica anagallis, and two other undetermined species.
Amethystea cærulea.
Ligustrum lucidum. β floribundum.
Phillyrea paniculata.
Olea (Osmanthus, *Lour.*) fragrans.
Syringa (vulgaris?) Chinensis. β Rothomagensis. S. villosa (Ligustrum Sinense, *Lour.*)
Justicia ventricosa. J. Chinensis. J. nigricans. J. bicolor. J. procumbens. J. paniculata.
Lycopus Europæus.
Hypoestes (Justicia, *Lour.*) purpurea.
Utricularia bifida.
Striga lutea.
Rosmarinus officinalis.

TRIGYNIA.

Piper (?) pinnatum.

TRIANDRIA.

MONOGYNIA.

Gladiolus undulatus (*hortis*).
Iris orientalis (*vel* Sibirica). I. Chinensis. I. Pallasii.
Kyllinga monocephala. K. triceps.
Pardanthus (Ixia, Moræa) Chinensis.
Moræa Sinensis.
Commelina medica. C. deficiens. C. polygama.
Aneilema (Commelina) Sinica.
Tonsella (Salacia, *Lour.*) Chinensis.
Cenchrus racemosus.
Scirpus tuberosus. S. fistulosus. S. acutangulus. S. junciformis. S. supinus.
Fimbristylis (Scirpus, *Lour.*) miliacea. F. autumnalis.
Papyrus odoratus.
Cyperus compactus. C. rotundus. C. albidus. C. difformis. C. iria.
Muricia Cochin-Chinensis.
Valeriana.

DIGYNIA.

Melica latifolia.

Arundo Phragmites.
Saccharum Chinense.
Aristida.
Microchloa setacea.
Apluda mutica.
Leersia.
Ischæmum aristatum. I. ciliare.
Thelepogon (Rottbollia) sanguineus.
Manisurus granularis.
Orthopogon (Panicum) crus corvi. O. crus galli.
Panicum patens. P. miliaceum.
Setaria glauca. S. viridis. S. Italica.
Triticum, Hordeum } Several undetermined species.
Lolium.
Poa panicea. P. Chinensis. P. (Briza) eragrostis. P. cylindrica. P. Malabarica.
Eleusine (Leptochloa) tenerrima. E. filiformis. E. Indica.
Agrostis plicata (*Lour.*)
Digitaria ciliaris. D. stolonifera.
Spinifex squarrosus.
Crypsis aculeata.

TRIGYNIA.

Lechea Chinensis.
Eriocaulon quadrangulare.
Mollugo triphylla (*Lour.*)

TETRANDRIA.

MONOGYNIA.

Acrodryon (Cephalanthus, *Lour.*) orientale.
Cephalanthus montanus. C. occidentalis (?) (*Lour.*)
Scabiosa (*vel* Succisa) leucantha.
Asterocephalus (Scabiosa) Cochin-Chinensis.
Galium tuberosum. G. Chinense (?).
Crucianella angustifolia.
Rubia cordifolia.
Callicarpa rubella. C. longifolia. C. purpurea. C. triloba.
Pavetta arenosa. P. parasitica (?).
Ixora blanda. I. rosea. I. crocata. I. coccinea. I. pavetta. I. novemnervia (?).

Hedyotis hispida. H. paniculata.
Sanguisorba officinalis.
Polyozus lanceolata.
Plantago major. P. Loureiri.
Brucea Sumatrana (Gonus amarissimus, *Lour.*)
Ammannia baccifera.
Dryandra cordata.
Trapa bicornis. T. Cochin-Chinensis (?).
Cissus umbellata.
Phyla Chinensis.
Elæagnus latifolia. E. pungens.
Rhopala, Spermacoce } Species undetermined.

DIGYNIA.

Hamamelis Chinensis.

TETRAGYNIA.

Ilex Chinensis.
Goniocarpus scaber. G. micranthus.

PENTANDRIA.

MONOGYNIA.

Mirabilis Jalapa.
Wedgelia corœensis.
Myosotis scorpioides.
Anchusa tenella. A. officinalis.
Echium.
Viola odorata. V. primulæfolia. V. tricolor.
Solea heterophylla.
Lysimachia.
Cyathula geniculata (?), (*Lour.*)
Primula prœnitens (Chinensis, *Lind.*) β flore albo. P. Chinensis (*Lour.*)
Dentella (Oldenlandia, *Lour.*) repens.
Ægiceras fragrans.
Azalea Indica. β purpurea plena. γ variegata. δ alba. ε aurantiaca. ζ Phœnicea. A. ledifolia.
Ophiorhiza Mungos.
Convolvulus bryonifolius. C. speciosus. C. biflorus. C. Sinensis (*Desrouss.*) C. Chinensis (*Kerr*). C. reptans. C. Japonicus. C. pannifolius. C. obscurus. C. Batatas. C. tomentosus. C. Pes capræ. C. sericeus.
Ipomœa Quamoclit. I. chryseides. I. tuberosa. I. speciosa. I. denticulata.

Plumbago rosea. P. Zeylanica.
Nicotiana fruticosa (Chinensis, *Fisch.*) N. Chinensis.
Datura ferox. D. Metel.
Bladhia Japonica.
Campylus Sinensis.
Vinca rosea.
Nerium Oleander.
Wrightia antidysenterica.
Tabernæmontana (Nerium) coronaria.
Strophanthus (Apocynum, *Lour.*) alternifolius. S. dichotomus.
Cerbera Chinensis (Dissolæna verticillata, *Lour.*)
Phyteuma bipinnata (*Lour.*)
Cordia (Varronia, *Lour.*) Chinensis.
Sideroxylon Cantoniense.
Ardisia lentiginosa. A. punctata. A. solanacea.
Pœderia fœtida.
Thela coccinea. T. alba.
Canthium Chinense. C. parviflorum.
Serissa fœtida (Dyssodia fasciculata, *Lour.*)
Argyreia arborea. A. acuta.
Psychotria Reevesii. P. Asiatica. P. serpens.
Nauclea Adina. N. Adinoides. N. Orientalis.
Leea spinosa (Aralia Chinensis, *Lour.*)
Lycium barbarum. L. Chinense. L. turbinatum. L. Treivianum.
Solanum dichotomum. S. nigrum. S. biflorum. S. Æthiopicum. S. melongena. S. diphyllum. S. verbascifolium.
Capsicum Sinense. C. annuum. C. baccatum. C. frutescens (var. ?).
Mussænda pubescens. M. Chinensis.
Hyoscyamus niger.
Erycibe paniculata.
Webera corymbosa.
Echites cordata.
Scævola (Koenigii ?).
Melodinus (Monogynus ?).
Buttneria (herbacea ?).
Achras Sapota.
Randia Sinensis.
Physalis Alkekengi.
Heliotropium Indicum.

Aglaia (Opilia) odorata.
Pittosporum Tobira.
Bæobotrys.
Vitis vinifera. V. heterophylla (*Th.*)
Campanula, two species.
Lobelia Chinensis. L. campanuloides.
Lonicera Periclymenum. L. flexuosa.
Caprifolium Japonicum. C. longiflorum. C. Chinense.
Vangueria edulis (?).
Genipa esculenta.
Gardenia scandens. G. radicans. G. florida. β flore pleno. G. Chinensis. G. volubilis. G. amœna, (Genipa flava, *Lour.*)
Euonymus Chinensis. E. Europæus.
Berchemia *vel* Oenoplia (Rhamnus, *Lour.*) lineata.
Rhamnus Theezans. R. soporifer.
Zizyphus Chinensis. Z. Jujuba. Z. albens. Z. (Aubletia, *Lour.*) ramosissima.
Celastrus cerifera (?).
Dalrymplea.
Sphenoclea Zeylanica.
Hovenia acerba (dulcis).
Cedrela rosmarinus.
Impatiens cristata. I. cochleata.
Balsamina Chinensis.
Plectronia Chinensis.
Desmochæta prostrata.
Illecebrum sessile.
Celosia cristata. β castrensis. C. argentea. C. comosa. C. margaritacea. C. coccinea.
Polychroa repens.
Musa coccinea.

DIGYNIA.

Plumeria acuminata. P. alba. P. obtusa.
Diplolepis vomitoria. D. apiculata. D. ovata.
Periploca (Pergularia, *Lour.*) Chinensis. P. divaricata (colitur).
Hoya carnosa (Stapelia Chinensis, *Lour.*) H. crassifolia. H. Potsii. H. trinervis.
Pergularia odoratissima. P. purpurea.
Cynanchum (Asclepias) Sibiricum.
Calotropis (Asclepias) gigantea.

Asclepias curassavica.
Cuscuta Chinensis.
Hydrolea inermis.
Panax aculeatus (Xanthoxylon trifoliatum, *Lour.*) P. fruticosus.
Swertia rotata.
Salsola.
Chenopodium Atriplicis. C. altissimum. C. aristatum. C. Scoparium (?). C. glaucum. C. viride.
Beta vulgaris.
Gomphrena globosa.
Ulmus Chinensis. U. pumila.
Evolvulus.
Gentiana aquatica.
Hydrocotyle Asiatica (Trisanthus Cochin-Chinensis, *Lour.*) H. Chinensis.
Sium Sisarum. S. Græcum (Ferula nudicaulis ?).
Caucalis orientalis.
Daucus Carota.
Cnidium Canadense (Athamanta Chinensis, *Lour.*)
Coriandrum sativum.
Fœniculum vulgare.
Apium graveolens.
Bupleurum.

TRIGYNIA.

Viburnum odoratissimum.
Sambucus Chinensis (nigra). S. umbellata (?).
Rhus Javanica. R. succedanea. R. semi-alata.
Ailanthus glandulosus.
Paliurus (? virgatus).
Basella nigra.
Tamarix Chinensis.

PENTAGYNIA.

Aralia scandens (palmata, *Lour.*) A. octophylla (var. ?).
Drosera umbellata.
Crassula pinnata. C. spinosa.
Statice Limonium.

HEXANDRIA.

MONOGYNIA.

Bambusa arundinacea. B. spinosa.

Ornithogalum Japonicum (O. Sinense, *Lour.*)
Fritillaria Cantoniensis. F. lanceolata.
Amaryllis radiata. A. Sarniensis. A. aurea.
Crinum Sinicum. C. asiaticum. C. anomalum. C. Zeylanicum. C. plicatum.
Nerine aurea. N. radiata.
Lilium speciosum. L. concolor. L. Japonicum. L. longiflorum. L. tigrinum. L. candidum. L. Pomponium. L. peregrinum.
Agave Cantala.
Allium sativum. A. Cepa. A. triquetrum. A. odorum. A. angulosum.
Agapanthus.
Asparagus.
Pancratium plicatum.
Polianthes tuberosa (colitur).
Convallaria Japonica. C. multiflora. C. verticillata.
Ananassa sativa (colitur).
Curculigo.
Urania speciosa (colitur).
Pontederia vaginalis.
Anthericum Japonicum.
Funkia Japonica. F. ovata. F. subcordata (Hemerocallis alba).
Hemerocallis disticha. H. fulva. H. graminea.
Tradescantia vaga. T. cristata.
Aloe Chinensis.
Dracæna ferrea. D. terminalis.
Barnardia scillioides.
Sanseviera carnea.
Disporum (Uvularia) Chinense.
Ophiopogon Japonicus. O. spicatus (Liriope spicata, *Lour.*)
Tacca pinnatifida.
Rohdea (Orontium, *Lour.*) Japonica.
Acorus gramineus. A. calamus (?). A. terrestris.
Calamus Scipionum.
Berberis Chinensis. B. Cretica.
Nandina domestica.
Loranthus Scurrula.
Triphasia (Aurantiola, *Lour.*) trifoliata.
Canarium Pimela (Pimela nigra, *Lour.*) C. album.
Juncus articulatus.

DIGYNIA.

Oryza sativa.

TRIGYNIA.

Rumex glomeratus. R. persicarioides. R. longifolius.
Melanthium Cochin-Chinense.

HEPTANDRIA.

MONOGYNIA.

Calla occulta. C. aromatica.

TETRAGYNIA.

Saururus Chinensis.

OCTANDRIA.

MONOGYNIA.

Jambolifera Chinensis.
Bœckia frutescens.
Vaccinium formosum. V. orientale.
Rhexia Malabathrica, and several undetermined species.
Lawsonia (Spinosa ?).
Scutula scutellata.
Mimusops.
Amoora cucullata.
Euphoria (Dimocarpus) Litchi. E. Longan.
Jussieua tetragona.
Marlea begoniæfolia.
Epilobium angustifolium. E. tetragonum.
Rhizophora.
Gaura Chinensis.
Koelreutera paniculata.
Daphne Indica. D. odora. D. triflora. D. cannabina.
Diospyros Kaki. D. vaccinioides.
Aspidastra punctata. A. lurida.
Populus.

TRIGYNIA.

Sapindus albus. S. abruptus. S. cardiospermum.
Cardiospermum.
Polygonum Loureiri (P. ciliatum, *Lour.*) P. emarginatum. P. Chinense. P. barbatum. P. tinctorium. P. Hydropiper. P. aviculare. P. amphibium. P. per-

foliatum. P. Tataricum. P. Fagopyrum. P. lapathifolium. P. dumetorum. P. Persicaria.

TETRAGYNIA.

Verea nudicaulis.
Kalanchoe spatulata. K. ceratophylla.
Paris polyphylla.

ENNEANDRIA.

MONOGYNIA.

Laurus camphora. L. aggregata. L. glauca.
Cassyta filiformis (Calodium Cochin-Chinense, *Lour.*)
Tetranthera cubeba. T. laurifolia. T. ferruginea.

TRIGYNIA.

Rheum palmatum. R. rhabarbarum. R. undulatum.

HEXAGYNIA.

Hydrocharis (?).

DECANDRIA.

MONOGYNIA.

Encianthus quinqueflorus. E. biflorus. E. reticulatus.
Melastoma sanguineum. M. dodecandrum. M. Malabathricum.
Osbeckia Chinensis. O. heteranthera.
Limonia (Glycosmis) citrifolia.
Cookia punctata (Quinaria Lansium, *Lour.*) C. anisata.
Murraya exotica. M. paniculata.
Adenanthera (pavonina?).
Poinciana pulcherrima.
Andromeda Japonica.
Guilandina Bondue.
Gœrtneria (Hiptage) obtusifolia.
Cercis siliquastrum.
Quisqualis glabra.
Aloexylon Agallochum.
Cathartocarpus fistula.
Cassia Sophora. C. torosa. C. Chinensis. C. gallinaria. C. pumila.
Macrotropis (Anagyris) Chinensis (A. inodora *et* fœtida, two var.)

Sophora Japonica.
Parkinsonia (Diphaca, *Lour.*) orientalis.
Aquilaria (Ophispermum, *Lour.*) Chinensis.
Ruta angustifolia (Chalepensis, *Lour.*)
Bauhinia scandens. B. acuminata.
Tribulus terrestris.
Jussieua erecta.

DIGYNIA.

Hydrangea hortensis.
Saxifraga sarmentosa (Chinensis, *Lour.*) S. cuscutiformis.
Dianthus Chinensis. D. Caryophyllus. D. Japonicus. D. cephalotes. D. arbuscula. D. plumarius. D. deltoides.

TRIGYNIA.

Deutzia scabra.
Stellaria.
Arenaria rubra.

PENTAGYNIA.

Cerastium repens (Arvense ?).
Lychnis grandiflora, *vel* coronata. (Hedona Sinensis. *Lour.*)
Biophytum (Oxalis, *Lour.*) B. sensitivum.
Oxalis corniculata.
Sedum stellatum. S. anacampseros.
Cotyledon spinosa.
Spondias Amara.
Mangifera pinnata.
Penthorum.

DECAGYNIA.

Averrhoa Carambola.

DODECANDRIA.

MONOGYNIA.

Vatica Chinensis.
Cratœva (Capparis, *Lour.*) falcata.
Eurya Chinensis.
Portulaca oleracea.
Macleya (Bocconia) cordata.
Elæocarpus (Adenodus, *Lour.*) E. Mangostana. E. sylvestris.
Asarum Virginianum.

DIGYNIA.

Agrimonia.

TRIGYNIA.

Reseda Chinensis. R. odorata (colitur).

TETRAGYNIA.

Dichroa febrifuga.

Aponogeton monostachys (Spathium Chinense, *Lour.*)

PENTAGYNIA.

Blackwellia grandiflora.

DODECAGYNIA.

POLYGYNIA.

Sempervivum tectorum.

Isopyrum adoxoides.

Hecatonia palustris, *Lour.* (? Ranunculus sceleratus.) H. pilosa, *Lour.* (? Ranunculus Cantoniensis.)

ICOSANDRIA.

MONOGYNIA.

Amygdalus Persica. A. communis. A. pumila.

Prunus semperflorens. P. domestica. P. Armeniaca.

Cerasus serratula. C. salacina. C. pseudo-cerasus.

Myrtus tomentosa (Canescens, *Lour.*) M. Chinensis. M. affinis (?).

Eugenia Malaccensis (colitur). E. uniflora. E. microphylla.

Psidium Cattleyanum. P. pyriferum. P. pomiferum. P. caninum.

Metrosideros.

Punica Granatum. β alba. γ flore pleno.

Cactus triangularis (? native).

Cereus undatus.

Phoberos Chinensis.

DI-PENTA-OCTO-GYNIA.

Spiræa Chamædryfolia. S. palmata. S. crenata (hypericifolia).

Pyrus spectabilis. P. communis. P. Sinensis. P. floribunda.

Cydonia vulgaris. C. Japonica. C. Sinensis.

Eriobotrya Japonica.

Mespilus Pyracantha.

Photinia glabra.
Rhaphiolepis (Cratœgus, *Lour.*) salicifolia. R. rubra.
Kerria (Corchorus) Japonica.

POLYGYNIA.

Chimonanthus fragrans. β grandiflorus.
Rubus parvifolius. R. reflexus. R. rosæfolius. R. Moluccanus. R. cordifolius.
Rosa microphylla. R. bracteata. β scabriuscula. R. involucrata. R. Nankinensis. R. Reevesii. R. semperflorens (Chinensis). R. Indica. R. Sinica. R. multiflora. R. Lawrenceana (?). R. hystrix. R. microcarpa. R. Banksiæ. R. alba. R. cinnamomea. R. spinosissima (?). R. flavescens. R. nivea. R. Grevillii. R. parvifolius.
Fragaria vesca.
Potentilla fruticosa.

POLYANDRIA.

MONOGYNIA.

Capparis Cantoniensis (?).
Corynephora punctata.
Actæa aspera (Augia ? Sinensis, *Lour.*)
Grewia nitida. G. affinis. G. microcos. G. asiatica.
Corchorus capsularis.
Lagerstrœmia Indica. L. Munchausia.
Chelidonium majus.
Ægle sepiaria.
Cistus.
Ternstrœmia.
Bixa Orellana.
Papaver somniferum.
Argemone Mexicana.
Euryale ferox.
Nymphæa pygmæa.
Delima.

DI-TRI-GYNIA.

Pœonia albiflora. P. Moutan.
Delphinium Chinense.
Trachytella Actæa.

POLYGYNIA.

Nelumbium speciosum.

Artabotrys odoratissimus (Uvaria uncata, *Lour.*)
Anona squamosa. A. muricata.
Unona odorata. U. discolor (Desmos Chinensis, *Lour.*)
Magnolia conspicua, *vel* Yulan. M. obovata. M. tomentosa. M. pumila. M. fuscata. β annonæfolia. M. inodora. (Liriodendron liliifera, *Lour.*) M. Coco. M. purpurea.
Guatteria rufa.
Clematis Chinensis. C. terniflora. C. florida. C. minor. C. brevicaudata. C. heracleifolia.
Michelia (Liriodendron, *Lour.*) Figo. M. Champaca.
Illicium anisatum.
Thalictrum Sinense.
Houttuynia cordata.

DIDYNAMIA.

GYMNOSPERMIA.

Ocimum canum.
Lumnitzera, *vel* Moschosma (Ocimum) capitata. L. ocimoides, *vel* acrocephalus (Ocimum polycladium).
Plectranthus nudiflorus. P. (Dentidia, *Lour.*) Nankinensis.
Stachys Artemisia.
Leonurus Sibiricus.
Leucas Chinensis.
Mentha crispa. M. aquatica. M. hirsuta. M. Pulegium. M. Canadensis.
Teucrium Polium.
Ajuga reptans.
Betonica officinalis.
Barbula Sinensis.
Lamium Garganicum.
Melissa Cretica.
Origanum dictamnus. O. Creticum. O. heracleoticum. O. Majorana.

ANGIOSPERMIA.

Vitex ovata. V. Negundo. V. incisa. V. spicata. V. trifolia.
Clerodendron (Volkameria, *Lour.*) inerme. C. fortunatum. C. infortunatum. C. lividum. C. squamatum. C. pumilum. C. fragrans. β flore pleno.

Xenopoma obovatum (?).
Harrachia (Crossandra) ? speciosa.
Mazus rugosus.
Gerardia glutinosa.
Buchnera asiatica.
Morgania (Gratiola, *Lour.*) hyssopioides. M. lucida.
Verbena officinalis.
Barleria procumbens.
Thunbergia grandiflora (cult.) T. angustifolia.
Incarvillea Chinensis.
Tecoma (Bignonia) grandiflora.
Bignonia undulata.
Acanthus ilicifolius. A. ebracteatus.
Digitalis Chinensis.
Sesamum orientale.
Linaria spuria. L. vulgaris.
Cornutia quinata.
Lepidagathis (Septas, *Lour.*) repens.
Picria Fel terræ.
Abelia Chinensis.
Gmelina.
Orobanche cærulea.

TETRADYNAMIA.

SILICULOSA.

Hutchinsia (Lepidium, *Lour.*) petræa.
Capsella Bursa pastoris.
Lepidium latifolium.

SILIQUOSA.

Raphanus sativus. β radicula. γ oblongus. δ oleifera. ε niger, vulgaris, rotundus, griseus, albus. R. biarticulatus.
Brassica oleracea. B. Chinensis. B. violacea.
Ricotia Cantoniensis.
Cardamine Chelidonia.
Arabis Sinensis.
Nasturtium Indicum. N. microspermum. N. amphibium.
Sisymbrium atrovirens.
Cleome viscosa.
Sinapis brassicata. S. integrifolia. β juncea. β Chinensis. S. Pekinensis.

MONADELPHIA.

TRIANDRIA.

Agyneia puber. A. impubes.
Bradleia Sinica.

TETRANDRIA.

Stemona tuberosa.
Salomonia petiolata (*vide* Monandria).

PENTANDRIA.

Passiflora cerulèa (?). P. Chinensis.
Luffa fœtida.
Benincasa cèrifera.
Erodium ciconium.
Zala asiatica.
Waltheria.

HEXANDRIA.

Pimela nigra *et* alba, *Lour.* (*vide* Canarium Pimela.)

OCTANDRIA.

Melia Azedarach.

DECANDRIA.

Geranium.

DODECANDRIA.

Pentapetes phœnicea.
Helicteres angustifolia. H. hirsuta.
Pterospermum.

ICOSANDRIA.

Dalechampia parvifolia.

POLYANDRIA.

Malva Mauritanica. M. verticillata. M. glabra.
Reevesia thyrsoidea.
Malachra Urena (Urena polyflora, *Lour.*)
Urena procumbens. U. lobata.
Althæa Chinensis. A. rosea.
Sida (Stauntonia) lanceolata. S. orbiculata. S. tiliæfolia.
Thea Chinensis, *vel* Cantoniensis. α viridis. β nigra. T. Bohea. T. oleosa.
Camellia Japonica (35 var.) C. oleifera. C. Sesanqua (?), plena, rubra, alba, semiplena. C. euryoides. C. reticulata.

Hibiscus acerifolius. H. Manihot. H. Syriacus. H. trionum. H. tiliaceus. H. Rosa Sinensis. H. mutabilis. H. esculentus. H. ochra.
Bombax orientale (Pentandrum, *Lour.*) Bombax Ceiba.
Gossypium herbaceum. G. religiosum.
Gordonia.
Barringtonia speciosa.

DIADELPHIA.

HEXANDRIA.

Corydalis (Fumaria) spectabilis.

OCTANDRIA.

Polygala glomerata. P. Sibirica. P. Chinensis.

DECANDRIA.

Arachis hypogœa.
Pterocarpus flavus.
Derris trifoliata.
Erythrina Indica. E. fulgens.
Rhynchosia volubilis.
Lespedeza polystachya. L. lagopodioides.
Trifolium globosum.
Melilotus Indica.
Crotalaria Chinensis. C. paniculata.
Abrus precatorius.
Robinia pygmæa. R. mitis. R. spinosa. R. amara. R. flava.
Caragana (Robinia) Chamlagu.
Medicago lupulina. M. falcata.
Phyllobium Chinense.
Stizolobium pruriens.
Lablab (Dolichos) Nankinicus. L. perennans.
Dolichos tetragonolobus. D. Chinensis. D. cultratus D. unguiculatus. D. gladiatus. D. purpureus. D. bifloru D. hirsutus. D. ensiformis. D. Soja. D. Catiang.
Pachyrhizus (Dolichos, *Lour.*) trilobus.
Phaseolus radiatus. P. Mungo.
Pisum sativum.
Faba vulgaris.
Indigofera rotundifolia. I. coccinea. I. tinctoria.
Phaca trifoliata. P. villosa (?).
Astragalus Chinensis. A. Sinicus, *vel* lotoides.
Glycine.

Zornia (Hedysarum, *Lour.*) elegans. Z. diphylla. Z. Zeylanica (?). Z. pulchella.
Apios Chinensis.
Æschynomene.
Hedysarum lutescens. H. latifolium. H. striatum. H. tomentosum. H. Gangeticum. H. triflorum.
Glycirrhiza echinata. G. glabra.
Onobrychis (Hedysarum, *Lour.*) crinita.
Cajanus Indicus (Cytisus Cajan, *Lour.*)
Tephrosia Chinensis.
Lourea reniformis (Hedysarum Loureiri).
Macranthus, Cochin-Chinensis.
Wisteria (Glycine). W. Chinensis. W. floribunda.

POLYADELPHIA.

ICOSANDRIA.

Citrus decumana. C. fusca. C. Aurantium. C. buxifolia. C. medica. C. Limonum. C. nobilis. C. Madurensis. C. Margarita.
Melaleuca.
Symplocos Sinica.

POLYANDRIA.

Hypericum Chinense. H. Olympicum. H. biflorum. H. monogynum. H. patulum.
Vismia dealbata (Hypericum petiolatum, *Lour.*) V. Cochin-Chinensis.

SYNGENESIA.

ÆQUALIS.

Cichorium endivia.
Borkhausia (Picris, *Lour.*) repens.
Leontodon Chinensis.
Lactuca sativa.
Sonchus Sibiricus. S. Floridanus. S. oleraceus.
Rhagadiolus (Lapsana, *Lour.*) edulis.
Prenanthes Chinensis.
Carthamus tinctorius.
Cirsium (Carduus) lanceolatum. C. tuberosum.
Serratula multiflora.
Spilanthus tinctorius (? Serratula tinctoria).
Acilepis squarrosa.
Eupatorium Chinense.

Ageratum ciliare.
Ethulia tomentosa.
Cacalia procumbens. *C. bulbosa. C. pinnatifida. C.* ovalis.
Bidens bipinnata. *B. Chinensis. B. pilosa.*
Pteronia tomentosa.

SUPERFLUA.

Artemisia Judaica. A. abrotanum. A. annua. A. vulgaris. A. Chinensis. A. tenuifolia (aquatica, *Lour.*) A. moxa. A. capillaris. A. integrifolia.
Carpesium Abrotanoides.
Baccharis Dioscoridis. B. Chinensis.
Dyssodia fœtida (Boebera?).
Conyza patula. C. hirsuta. C. Chinensis.
Xeranthemum Chinense.
Cotula (Grangea) cuneifolia. C. minima.
Matricaria Cantoniensis.
Anthemis apiifolia.
Pyrethrum Parthenium.
Chrysanthemum Indicum. C. Sinense (44 varieties).
Erigeron hirsutus (? alpinus). E. incisus. E. Chinensis.
Solidago decurrens. S. Cantoniensis. S. Virgaurea.
Cineraria Chinensis.
Inula Japonica.
Senecio divaricatus. S. speciosus.
Tussilago Farfara.
Chaptalia lyrata (Tussilago anandria, *Lour.*)
Aster Indicus. A. hispidus.
Callistemma hortensis, var. rubrum, album, variegatum, multiplex brachyanthum.
Tagetes patula.
Siegesbeckia orientalis.
Buphthalmum oleraceum.
Verbesina Chinensis.
Jägeria (Verbesina, *Lour.*) calendulacea.
Eclipta (Verbesina, *Lour.*) spicata. E. erecta. E. prostrata.

FRUSTRANEA.

Cullumia (Gorteria, *Lour.*) setosa.
Coreopsis leucorhiza.
Actinea biternata.

Helianthus Cochin-Chinensis (giganteus, *Lour.*)

SEGREGATA.

Sphæranthus Cochin-Chinensis (?). S. Chinensis. Elephantopus.

GYNANDRIA.

MONANDRIA.

Habenaria Susannæ.
Glossaspis tentaculata.
Limodorum falcatum (?).
Spiranthes amœna. S. pudica.
Aerides odoratum.
Vanda cruenta. V. paniculata. V. tessellata. V. teretifolia. V. multiflora. V. Roxburgii. V. recurva.
Cirrhœa dependens.
Cymbidium xiphiifolium. C. Sinense. C. lancifolium. C. ensifolium.
Calanthe striata.
Bletia Tankervilliæ. B. hyacinthina.
Cœlogyne fimbriata.
Dendrobium moniliforme.
Sarcanthus paniculatus. S. teretifolius.
Renanthera coccinea.
Angræcum falcatum.
Ceraia simplicissima.
Epidendrum tuberosum. E. aloides.
Eria (Octomeria) rosea.
Geodorum (nov. sp.)

HEXANDRIA.

Aristolochia Indica.

MONŒCIA.

MONANDRIA.

Artocarpus integrifolia (Polyphema Jaca, *Lour.*)
Euphorbia Cyparissias. E. Esula. E. tithymaloides.

DIANDRIA.

Lemna minor (?).

TRIANDRIA.

Zea Mays.
Coix Lachryma (?). C. exaltata.
Carex ramosa.
Typha latifolia.

TETRANDRIA.

Buxus sempervirens. B. Chinensis.

Morus alba. β macrophylla, γ nana, δ ovalifolia, ε rosea. M. rubra. M. Indica. M. Sinensis.

Urtica nivea. U. interrupta.

PENTANDRIA.

Amaranthus tricolor. A. cruentus. A. polygamus. A. tristis. A. oleraceus. A. hecticus. A. caudatus.

Xanthium Strumarium (?). X. orientale.

Procris (Dorstenia, *Lour.*) Chinensis. P. (Vanieria, *Lour.*) Cantoniensis.

Najas (? Zostera) marina.

HEXANDRIA.

Cocos nucifera.

POLYANDRIA.

Sagittaria Sinensis (S. trifolia). S. obtusifolia.

Myriophyllum spicatum.

Castanea vesca. C. Chinensis.

Corylus.

Quercus cornea. Q. densifolia. Q. Chinensis. Q. dentata.

Juglans regia.

Codiæum (Phillaurea, *Lour.*) chrysosticton.

Tridesmis hispida. T. tomentosa.

Salisburia adiantifolia.

Begonia discolor (B. Evansiana). B. grandis. B. unifolia (var. or new species).

Caladium cuculatum.

Arum triphyllum. A. Indicum. A. spirale. A. esculentum.

Caryota mitis.

MONADELPHIA.

Areca Catechu.

Pinus Massoniana. P. Sinensis. P. paludosus. P. longifolia. P. Larix.

Belis jaculifolia (*or* Cunninghamia lanceolata).

Cupressus sempervirens. C. Thyoides. C. pendula.

Thuja orientalis. T. pensilis.

Podocarpus macrophyllus. P. Chinensis. P. nereifolius.

Croton congestus. C. Tiglium. C. aromaticus. C. crassifolius. C. lævigatus.

Stillingia sebifera.
Ricinus communis.
Acalypha pauciflora. A. brachystachya. A. hispida.
Phyllanthus turbinatus. P. lucens. P. Cantoniensis. P. villosus. P. cuneatus.
Emblica officinalis (?).
Aleurites.
Jatropha Janipha. J. Curcas.
Sterculia platanifolia. S. Balanghas, *vel* nobilis. S. longiflora. S. lanceolata.
Elœococcus vernicia.

SYNGENESIA.

Tricosanthes anguina.
Bryonia umbellata (hastata, *Lour.*)
Momordica Luffa. M. Charantia. M. cylindrica.
Cucumis sativus. C. Melo. C. acutangulus. C. Maderaspatanus (?).
Cucurbita lagenaria. C. Pepo. C. Melopepo. C. Citrullus.

DIÆCIA.

MONANDRIA.

Pandanus odoratissimus.

DIANDRIA.

Salix Babylonica. S. fragilis.
Vallisneria spiralis.
Triadica Sinensis.

TETRANDRIA.

Trophis cordata.
Tetradium (Brucea) trichotomum.
Broussonetia papyrifera.

PENTANDRIA.

Cannabis sativa.
Spinacia oleracea.
Viscum.
Antidesma scandens.
Xanthoxylum nitidum (Fagara piperita, *Lour.*) X. Avicennæ. X. Clava Herculis.

HEXANDRIA.

Smilax China. S. lanceolata.

Dioscorea alata. D. oppositifolia.

DECANDRIA.

Carica Papaya.

DODECANDRIA.

Menispermum (Fibraurea, *Lour.*) tinctorium. M. ovalifolium. M. hexagonum. M. trilobum.
Euclea pilosa. E. herbacea.

ICOSANDRIA.

Rottlera Chinensis. R. Cantoniensis.

POLYANDRIA.

Cycas revoluta.
Mallotus Cochin-Chinensis.

MONADELPHIA.

Juniperus Barbadensis. J. Chinensis. J. glauca.
Taxus nucifera. T. verticillata.
Excœcaria Cochin-Chinensis.
Nepenthes Phyllamphora. N. distillatoria.

GYNANDRIA.

Cluytia monoica.

POLYGAMIA.

MONŒCIA.

Sorghum (Holcus) saccharatum. S. vulgare.
Anthisteria ciliata.
Andropogon Bladhii. A. acicularem.
Spinifex squarrosus.
Eurya Chinensis. E. Japonica.
Mimosa corniculata. M. fera.
Acacia Nemu (Mimosa arborea, *Lour.*)
Inga bigemina.
Bœhmeria (Parietaria) Cochin-Chinensis.
Desmanthus natans.

DIŒCIA.

Gleditschia horrida. β purpurea. G. Sinensis.
Fraxinus Chinensis.
Rhapis flabelliformis.
Anacardium (Indicum ?).

TRICŒCIA.

Ficus Carica. F. simplicissima. F. repens. F. stipulata. F. pumila.

CRYPTOGAMIA.

FILICES.

EQUISETALES. Equisetum arvense. E. hyemale.

PTERIDALES, *vel* FILICES VERÆ.

Ophioglossum Lusitanicum.
Osmunda.
Lygodium microphyllum (Ophioglossum scandens, *Lour.*) L. microstachyon. L. Japonicum.
Schizæa dichotoma.
Meniscium triphyllum.
Tænitis Chinensis.
Nothochlæna piloselloides.
Niphobolus pertusus. N. Linqua.
Polypodium ligulatum. P. quercifolium. P. repandum. P. simile. P. hastatum.
Pteris serratula. P. semipinnata. P. vittata. P. Chinensis. P. Aquilina. P. caudata.
Lindsæa flabellulata.
Woodwardia (Japonica affin.)
Blechnum orientale.
Trichomanes Sinensis.
Aspidium varium. A. fragrans (?). A. Baromez. A. falcatum.
Adiantum flabellulatum. A. pallens.
Asplenium lanceum.
Davallia Chinensis.
Hydroglossum.

SELAGINALES, *or* LYCOPODIALES.

Lycopodium cernuum. L. involvens. L. sp. unknown.
Psilotum triquetrum (Bernhardia dichotoma, *Lour.*)
Azolla filiculoides.
Marsilea natans. M. quadrifolia.

MUSCI.

MUSCI VERI, *or* BRYALES.

Bryum (Polytrichum?) undulatum.
Barbula.
Hypnum.

MUSCI HEPATICI, *or* MARCHANTIALES.

Marchantia (sp. undetermined).
Jungermannia conferta. J. globosa. J. digitata.

CHARALES.

Chara, 1 sp. undetermined.

ALGÆ.

LICHENALES.

Lecanora, *vel* Parmelia tartarea. P. scopulorum. P. alba. P. glandulifera. P. coronata. P. applanata. P. pulvinata. P. byssiseda. P. endochroma. P. farinacea. P. duplicata.

Chiodecton effusum. C. Meratii. C. depressum. C. paradoxum.

Porophora peliostoma. P. macrocarpa. P. granulata. P. uberina.

Ocellularia Cinchonarum. O. urceolaris. O. discolor. O. pupula.

Stigmatidium compunctum.

Verrucaria clandestina. V. cartilaginea. V. marcida. V. annularis. V. myriocarpa. V. limitata. V. macrozoma. V. Acharii. V. Cinchonæ. V. Catervata. V. phœa. V. salebrosa.

FUCALES.

Sargassum vulgare. S. serratifolium. S. spinifex. S. confusum. S. heterophyllum. S. piluliferum. S. pinnatifolium. S. microceratum. S. fulvellum. S. macrocarpum. S. sisymbrioides. S. Horneri. S. pallidum. S. hemiphyllum.

Rhodomela Thunbergii.
Fucus vesiculosus.
Chondria uvaria.
Cystoseira granulata.
Chorda Filum.
Laminaria saccharina.
Gigartina tenax.

CONFERVALES.

Ectocarpus littoralis.
Griffithsia corollina (?).

FUNGI.

Fungi. Agaricus deliciosus. A. integer (*Lour.*) A.

campanulatus (?). A. androsaceus (?). A. ramosus (?). A. arenarius (?).

Boletus (Polyporus) igniarius (?). B. suberosus (?). B. versicolor (?).

Peziza Auricula.

Clavaria pistillaris. C. muscoides.

Clathrus Mokusin.

(? Merisma crispatum).

Mucor (*or* Ascophora) Mucedo.

Aspergillus (*or* Monilia) glaucus.

Trypethelium variolosum. T. verrucosum. T. porosum. T. clandestinum. T. sclerotium.

Graphis globosa. G. nana. G. scaphella. G. tumidula. G. duplicata. G. conglomerata. G. exilis. G. fulgurata. G. Peruviana. G. oryzæformis. G. rubiginosa. G. Laubertiana. G. rugulosa. G. chlorocarpa. G. Grammitis. G. Balbisii. G. cinerea. G. glaucescens. G. endochroma. G. Acharii. G. caniculata. G. marcescens. G. cinnabarina. G. hæmatites. G. Dumasii.

Asterisca Cinchonarum.

Platygramma gregaria. P. serogrąpta. P. sulfurea. P. Lyellii. P. coccinea.

Patellaria tuberculosa. P. diplacia. P. biformis.

Sticta Kunthii. S. pulmonacea.

Peltigera Cinchonarum.

BYSSINÆ.

Rhizomorpha Cinchonarum.

Byssus (*vel* Lepra) candelaris.

CHAPTER VIII.

Conspectus of the Flora of China, as far as hitherto examined, with reference to the Natural Orders of which it affords Examples, and the Uses to which the most important Plants are applied by the Chinese.

Natural Orders of the Flora of China—Algæ—Fungi—Musci—Filices—Gramina; Sugar-cane, Rice, Bamboo—Palmares—Air-plant—Pinares; Pine-forests—Rosares—Oaks—Mulberry-plantations—Camphor-laurel—Varnish-tree—Tallow-tree—Rosales—Leguminous Plants—Fruit-trees—Ginseng—Cotton-plant—Tea-plant—Orange-tree—Syringales—Tobacco-plant—Concluding Remarks.

The Linnæan system, although perhaps the best fitted of any for the arrangement of a simple catalogue of plants, gives necessarily a very obscure and imperfect idea of the character of the vegetation in any particular district. It seems, therefore, important, in treating of the Botany of China,—a country of the Flora of which there is at present so little known,—to reduce the principal plants to their natural associations; and, without forming another special catalogue, to show what natural groups have representatives in the Flora of this vast empire. As there is little difference between authors as to the *ultimate orders, families,* or *groups* of genera, and as many of the minor associations are local, we shall, to avoid prolixity, enumerate only the primary orders and sections, when the secondary or subordinate ones are without represen-

tatives in the Flora of China; and shall follow, in the conspectus, the same course of arrangement which we have pursued in our "Outlines of Botany."

CELLULARES.

ACOTYLEDONES. MYCAFFINES.

ALGÆ.

CONFERVALES. Of the Chinese articulate algæ, very few are known to Europeans; they are indeed in every country among the last plants which are collected or minutely examined. It is therefore not surprising, that although we are assured the fresh waters of Northern China are not without confervæ, two only, and those marine species, viz. *Ectocarpus littoralis*, and *Griffithsia corollina*, are all that as yet have been reported in our scientific catalogues.

FUCALES. With the marine inarticulate algæ, the seas which wash the shores of the empire would appear to be well stocked. Of these, several species of *Sargassum*, *Rhodomela*, *Fucus*, *Cystoseira*, *Chorda*, and *Laminaria*, are examples. The tropical *Gelidium*, well known to Europeans from its being the substance with which the Java swallows construct those edible nests so much prized as food, although we have no evidence of its being found on the coasts of China, can scarcely be passed without mention here.

Gigartina tenax, which also abounds, is, from the tenacity of the jelly it affords, a very valuable economical plant, as forming the basis of glues and varnishes. "Though a small and apparently

a worthless weed, the quantity annually brought to Canton from the provinces of Fo-kien and Tche-kiang is said by Mr Turner to amount to upwards of 27,000 lbs. It is sold at the rate of sixpence or eightpence per lb., and is used for the purposes to which we apply glue and gum-arabic. The Chinese employ it chiefly in the manufacture of lanterns, to strengthen or varnish the paper, and sometimes to thicken or give a gloss to silks or gauze." In addition to the above, Dr Neill thinks it probable that this seaweed is the principal ingredient in the celebrated gummy matter called *hai-tsai*. In China and Japan, windows are often made merely of slips of bamboo crossed diagonally, and having their lozenge-shaped interstices wholly filled with the transparent glue of hai-tsai.

This hai-tsai is also prized as an article of food; indeed its name signifies "sea-vegetable." The *chin-chou*, which is also a mucilaginous or jelly-like preparation, something resembling the hai-tsai, and like it is used both as food, glue, and varnish, is said to be made from the Laminaria saccharina, as well as other species of fucus.

The number of *Sargassa* found in the same seas cannot fail to attract attention; and that eminent botanist Dr Greville observes, that there is a group of this genus distinguished from the rest by their terminal fructification, slender habit, small nerveless leaves, and often elongated vesicles, which is almost peculiar to the waters of China and Japan. As for example, *Sargassum fulvellum, microceratum, macrocarpum, sisymbrioides, Horneri, pallidum* and *hemiphyllum* [Algæ, Britt. xiii.]

Lichenales. The various barks and woods

which, for commercial purposes, have been brought from that country into Europe, have incidentally rendered us acquainted with a much greater number of the lichens and their allies than of other cellular plants, and with many more than we should have known had it not been for the circumstance of their growing upon and adhering to articles of commercial value. Thus we have recognised, upon various barks, eleven or twelve species of *Lecanora* or *Parmelia;* four of *Chiodecton;* as many of *Porophora* and *Ocellularia,* besides twelve species of *Verrucaria,* twenty-five of *Graphis,* and several of the genera *Trypethelium, Sticta, Peltigera, Patellaria, Stigmatidium,* and *Platygramma;* to which must be added two examples of those fungoid lichens, *Rhizomorpha* and *Byssus.*

FUNGI.

Mucedinales. The small fungi which form mouldiness and mildew, with those which constitute some kinds of blight, we have sufficient evidence, are as common in China as in other parts of the world; but of these a solitary species of *Ascophora* and *Aspergillus* are all that have been recognised by science.

Tuberales. Truffles are said to be found in that country; and mention is made by some of the earlier voyagers of an underground vegetable of considerable size, that is esteemed as food, and which has been called by them a *truffle;* but the accounts of this substance are unsatisfactory. There is a *Clathrus* however known, and many others would doubtless be found were opportunity afforded.

Boletales. Several species of *Agarici* are known

to belong to the Chinese flóra, some of which are eatable. From the figures in their works on Materia Medica, it would appear that several *Boleti* (*Polypori*), as *B. igniarius, B. suberosus,* and *B. versicolor,* are also natives. A species of *Peziza* has been likewise found, and two or three species of *Clavaria,* one of which grows on elephant's dung, and is said by Loureiro to be esteemed as food. *Leotia amara* is also probably indigenous, as it is a native of Cochin-China.

MUSCI.

MUSCI HEPATICI, or HEPATICALES. Three *Jungermanniæ,* and an undetermined species of *Marchantia,* are all the representatives of this group which have hitherto been observed.

MUSCI VERI, or BRYALES. One species of *Bryum,* or *Polytrichum,* and another of *Barbula,* are the only Chinese mosses of which mention is made by travellers.

CHARALES. Existence just known; one species was noticed by the naturalist attached to Lord Macartney's embassy, but which species it was he observed still remains undetermined.

ENDOGENÆ.

MONOCOTYLEDONES, AND TUBIVASCULAR ACOTYLEDONES, OR TERMAFFINES.

FILICES or FILICARES.

SELAGINALES, or LYCOPODIALES. Three species of *Lycopodium,* and one of *Psilotum,* represent the natural family *Lycopodiaceæ* in China. The two

small groups *Salviniaceæ* and *Marsileaceæ*, have also been recognised; the former being represented by *Azolla filiculoides*, and the latter by two species of *Marsilea*, viz. *M. natans*, and *M. quadrifolia*. Of the *Isoetaceæ* none have been hitherto discovered.

PTERIDALES, or FILICALES. Seventeen genera of true ferns are already known as indigenous, and amongst these is the curious *Aspidium Baromez*, or Tartarian lamb, of which such strange tales have long been told. Fresh plants are often seen in the markets of Macao, whence they have been brought to Europe, but none have reached this country alive. *Aspidium fragrans*, which is a native of China, is occasionally used as a substitute for tea; and *Nothochlæna piloselloides*, which was received by Abel along with other ferns from the apothecaries' stores, is valued by the people for its medicinal powers. It is administered in infusion.

EQUISETALES. *Equisetum arvense*, and *E. hyemale* (both British species), are also natives, and are the only representatives of the *Equisetaceæ* hitherto found in China.

GRAMINA.

GRAMINEÆ, or GRAMINALES. Of the cereal grasses, the most important, and those which afford the chief supplies of corn, are rice (*Oryza sativa*), in the southern provinces, especially in swampy or easily-flooded districts; and Barbadoes millet (*Holcus sorghum*), the *kow-leang*, or *lofty corn*, in the northern parts of the empire. Other grains are also cultivated, such as *Setaria Italica*, *Orthopogon Crus Galli*, &c.

Several species of *Triticum* and *Hordeum* are also indigenous; but neither wheat nor barley is much prized; these, with the other grains, are chiefly used by the common people. The Chinese sugar-cane is very distinct from that cultivated by Europeans in the West Indies: it was once considered to be merely a variety, but is now admitted as a distinct species. Among the other more remarkable and useful gramineous plants, the bamboo (*Bambusa arundinacea* et *spinosa*), Job's tears (*Coix lachryma*), and two species of *Andropogon*, deserve to be mentioned. Of the fodder-grasses little can be said; for, as meadows are rare, and, from their want of flocks and herds, grazing farms unknown to the Chinese, pasturage is neglected; although, from the various species of *Poa*, *Panicum*, and *Agrostis*, already enumerated, it is evident that, with care, good pasture might be provided.

The difference between the Chinese and West Indian sugar-cane has been already adverted to. In diameter they are about equal, but the Chinese cane is longer jointed, and is therefore believed to yield more juice. The internodes in the one are about six inches in length, and those of the other seldom exceed four. As in the West Indies, so in China, the people employed in the fields during this season are observed to get fat and sleek, and many of the Chinese slaves and idle persons are frequently missing about the time that the canes become ripe, hiding themselves, and living altogether in the plantations. Under the roots of the canes is found a large white grub, which, when fried in oil, is eaten as a dainty by the Chinese.

The *lock-soy* of China is a kind of vermicelli made

from rice. The Chinese grow two kinds of rice,—the red and the white; and, in some fertile districts, the crops are sown and reaped one after each other in an almost inconceivably short space of time. Thus Staunton, with much *naiveté*, observes, "Satisfied with *two* crops of rice and *one* of sugar in the year, the Chinese husbandman suffers the land to remain at rest till the following spring."

CYPERALES, or CALAMARIÆ, representatives of all the three types or subordinate groups of the *Calamariæ*, viz. the *Papyraceæ*, *Scirpaceæ*, and *Caricaceæ*, are met with native in China. Of these, *Carex ramosa*, *Scirpus tuberosus* and *fistulosus*; *Fimbristylis miliacea*, and *Cyperus compactus*, *rotundus*, and *albidus*, are examples.

As few of the *Cyperales* afford food, they are little regarded by the Chinese, and but little is known of them by Europeans. The water-chestnut is, however, a notable exception. Its tuberous roots (*rhizomata*) form one of the most esteemed of their aquatic esculent vegetables, and many acres in the neighbourhood of Canton are occupied in its cultivation. This vegetable is the *Scirpus* or *Eleocharis tuberosus* of botanists.

Mr Kerr, in his notes on the sketches of Chinese plants deposited in the museum of the East India Company, observes, that there is a curious grass (or sedge) called *lou-chu-lae*, which grows on sandy ground near the seashore in some of the islands in the vicinity of Macao. "The Chinese name," he says, "signifies an enemy to rats, and it is so called from its stiff bristly stalks being used to stop up rat-holes."

PALMARES.

PALMÆ, or PHŒNICIALES. The cocoa (*Cocos nucifera*), the catechu (*Areca Catechu*), the rattan or cane-palm (*Calamus Scipionum*), and one of the fan-palms (*Rhapis flabelliformis*), are the representatives of this order in China. Other species probably exist in the central or southern provinces; but they have not been hitherto noticed by Europeans.

JUNCALES. Of the subordinate divisions of this group, the following representatives have been recognised as indigenous:—

Pandanaceæ, or *Pandaneæ*, *Pandanus odoratissimus*, the screw-pine, so remarkable for the emission of roots at various intervals through the hardening circumference of its stem, whereby it establishes continually fresh communications with the soil, and opens new channels for the absorption of food, and whence it is enabled to escape for a time that inevitable death which the peculiar structure of endogenous plants entails upon them.

TYPHACEÆ. *Typha latifolia*, the reed-mace, which is likewise a native of Britain.

ACORINÆ, or AROIDEÆ. Of the *Aroideæ veræ* or *Callaceæ*, Calla occulta and C. aromatica, Caladium cuculatum, and Arum triphyllum, Indicum, spirale, and esculentum, may be taken as examples. Of the *Orontiaceæ*, we find Acorus gramineus, terrestris, and (?) Calamus, with Rhodea Japonica, Houttuynia cordata and Aspidastra lurida; of this latter, A. punctata seems to be only a variety, although by some persons it has been considered specifically distinct.

Of the *Lemnaceæ*, one species of the normal genus

has been observed, and that is believed to be Lemna minor: probably other species are also to be found; as these, like many aquatic plants, enjoy a very extensive geographical distribution.

NAYADINÆ, or FLUVIALES. Najas (? Zostera) marina, and Aponogeton monostachys, the Spathium Chinense of Loureiro, represent the *Nayadaceæ*. Of the *Juncaginaceæ* and *Podostemaceæ*, there have not been any representatives hitherto observed.

JUNCINÆ. Eriocaulon quadrangulare represents the small group *Eriocaulidæ* of the *Restiaceæ*. The true rushes seem to have excited but little attention among naturalists; for they have not specifically distinguished any of those which doubtless abound in the swamps of China. We however learn, that their pith is applied by the natives to a similar purpose as by Europeans, viz. to furnish wicks for their lamps.

LILIALES. The following are the most important plants belonging to the several subordinate divisions of this group:—

EPHEMERINÆ. *Ephemeraceæ*, or *Commelineæ*.—Tradescantia cristata, Aneilema Sinica, and Commelina deficiens, with one or two other species. Philydrum lanuginosum, the type of Brown's small group *Philydreæ*, is also a native of China.

ALISMINÆ. *Alismaceæ*.—Sagittaria Sinensis. The tuberous roots of this plant contain much farinaceous matter, and are esteemed as food by the Chinese. It is in general cultivation in low marshy grounds, and is another of those vegetables with which the Chinese enforce otherwise steril swamps to yield supplies of human food.

LILIACINÆ. PONTEDERIACEÆ. Pontederia vaginalis.

ASPHODELACEÆ, or *Asphodeleæ*.—Allium sativum, A. cepa, A. triquetrum, A. odorum, A. angulosum. Barnardia scillioides. Ornithogalum Japonicum. Anthericum Japonicum. Dracæna ferrea and terminalis. The latter is planted as a landmark in China, as well as in India.

HEMEROCALLIDEÆ.—Agapanthus. Funkia subcordata. Polianthes tuberosa (cult.) Sanseviera carnea. Hemerocallis disticha, fulva, graminea. Aloe Chinensis.

LILIACEÆ. Fritillaria Cantoniensis, lanceolata. Lilium speciosum, concolor, Japonicum, longiflorum, tigrinum, candidum, pomponium, and peregrinum.

MELANTHACEÆ, or COLCHICACEÆ. Melanthium Cochin-Chinense, and Disporum fulvum or Uvularia Chinensis.

SMILACEÆ. Ophiopogon spicatus. Smilax China, and lanceolata (?) and Paris polyphylla.

MUSALES. The following are the representatives of the subordinate divisions of this group in the Flora of China :—

TACCINÆ. TACCACEÆ. Tacca pinnatifida. The root-stake of this plant is large and fleshy, like that of the yam ; and although bitter and acrimonious when raw, becomes, when rasped and steeped in water, bland and wholesome. The leaf-stalks also, when boiled, lose their deleterious properties, and are esteemed as food both in China and Cochin-China.

DIOSCORACEÆ. Dioscorea alata, D. oppositifolia. The importance of the yam as affording a large supply of wholesome nutritious food is too well known to need any comment; and to its value as a diete-

tic vegetable, the Chinese are not insensible. Like the Tacca just mentioned, and the Bryonies of Europe, its juices are acrimonious; but all acridity is dissipated by heat.

NARCISSINÆ. *Bromeliaceæ.* — Agave Cantala, Ananassa sativa, cultivated.

AMARYLLACEÆ. The *Hypoxidæ* are represented by a species of Curculigo, and the *Amaryllidæ* or *Amaryllideæ*, by Pancratium plicatum, two species of Nerine, four or five of Crinum, and three of Amaryllis.

IRIDACEÆ, or IRIDEÆ. Moræa Sinensis, Pardanthus Chinensis, Iris Orientalis, Chinensis, and Pallasii, and Gladiolus undulatus; the latter is found only in gardens.

SCITAMINÆ. *Musaceæ.*—Musa coccinea. Urania speciosa, cultivated.

Zinziberaceæ.—Alpinia diffusa, A. bracteata. Hellenia Chinensis, H. abnormis. Placentaria (*vel* Costus) speciosus.

Ginger is much grown as a dietetic plant in the hilly regions, and is sold in the shops in a green state as a common vegetable.

Marantaceæ or *Canneæ.*—Canna patens.

ORCHIDINÆ. *Orchideæ*, or *Orchidaceæ.*— The Chinese Flora contains not less than nineteen genera belonging to this natural association, viz. Aerides, Vanda, Spiranthes, Habenaria, Glossaspis, Limodorum, Cirrhœa, Cymbidium, Calanthe, Bletia, Cœlogyne, Dendrobium, Sarcanthus, Renanthera, Angræcum, Ceraia, Epidendrum, Eria, and Geodorum.

The celebrated air-plants belong to the genera Vanda and Aerides. It is stated in the Encyclopædia of Plants, that they possess the peculiar pro-

perty of existing many months suspended in air, and that few other Orchideæ are capable of enduring for any considerable period such a removal from their natural places of growth. The true species of Aerides are "beyond all comparison the most delightful productions of the vegetable world. Their flowers are arrayed in long spikes or racemes of delicate colours and delicious fragrance. Hung up in a room in their native country, a little before flowering, they continue to unfold their blossoms in gradual succession for many weeks." The King of Belgium, when Prince Leopold, obtained a branch three feet long, which had some hundreds of large scarlet and yellow flowers. . .

Hydrocharidæ. *Hydrocharideæ.*—Hydrocharis. *Vallisneriaceæ.*—Vallisneria spiralis.

EXOGENÆ.

DICOTYLEDONES. CRESCAFFINES.

PINARES.

Zamiales, or Cycadeæ.

Cycas revoluta.—This plant is cultivated in China and Japan, where it is esteemed, as in many other parts of the world, a wholesome and nutritious food. The pith in these curious links of the exogenous and endogenous divisions of the vegetable kingdom is most abundant, and resembles, both in its profusion and qualities, that cellular substance in various palms which is known under the name of sago. The seeds are also eatable.

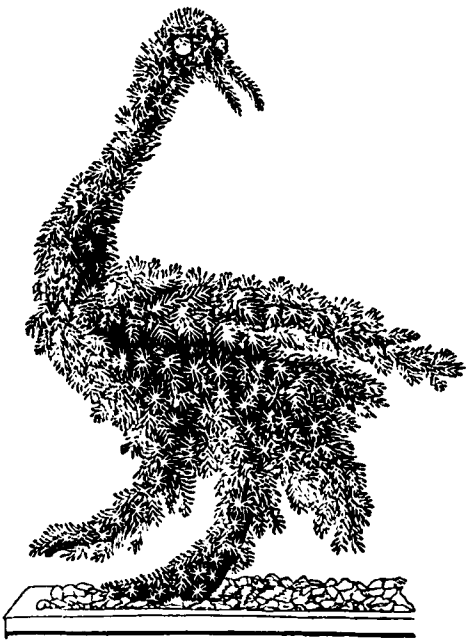
Pineales, or Coniferæ. The following are the representatives of each of the three minor divisions of this order in the Flora of China:—

ABIETINÆ. *Taxaceæ.*—Pinus Sinensis, P. paludosus, P. Massoniana, P. Pinea (?), P. longifolia, P. Larix. Belis jaculifolia (*vel* Cunninghamia Lanceolata).

CUPRESSINÆ. *Thujaceæ.*—Cupressus sempervirens, C. thyoides, C. pendula. Thuja Orientalis, T. pensilis. Juniperus Barbadensis, J. Chinensis, J. glauca.

TAXINÆ. *Taxaceæ.*—Taxus nucifera, T. verticillata. Podocarpus macrophyllus, P. Chinensis. Salisburia adiantifolia (*vel* Gingko biloba).

Although wood is scarce in many parts of China, and fuel, both coal and charcoal, is often brought from great distances, still in other districts the high grounds are described as being well wooded, and among the forests various kinds of pine are said to be abundant. The several recognised species have just been enumerated; but of these the larches would seem to be the most generally encouraged, and the most luxuriant in their growth. "Every mountain," we are told, "either too steep or too rocky to be applied to any other use, is planted to the top with various kinds of pines; but most commonly with the larch, which is preferred for the purposes of building." Large groves of P. Massoniana, amongst which P. lanceolata, and perhaps P. paludosus, occasionally occur, were noticed by Abel; and he says, large rafts of timber, often a mile in length, formed of these trees, are floated from the hilly districts down to Canton. "The pines which bear large cones (*Pinus Pinea?*) have their kernels as much relished by the Chinese as they are by the inhabitants of Italy." Great quantities of the arbor vitæ (Thuja) are also



occasionally met with, and those trees were observed by our embassies, not only in great abundance, but "of a prodigious height, in the valley in which stands the city of Yang-tcheou-fou."

The juniper is the plant most frequently metamorphosed by the Chinese gardeners into a rude semblance of an animal, including most varieties of birds and beasts.

The fruit of the Podocarpus nereifolius is eatable, as well as that of the Gingko (or Salisburia adian-

tifolia). This latter is the *qua-tchow* of the Chinese; and Abel says it is exposed in such immense quantities for sale in the markets, as to prove its extensive use amongst the natives; but whether used as a fruit, a vegetable, or a medicine, he could not ascertain. Kæmpfer tells us that the kernels are supposed to aid digestion. The fruit of the *Taxus nucifera* is also brought to market, and its seeds eaten at desserts.

ROSARES.

QUERNEALES (*Exogenæ Angiospermæ apetalæ*). Representatives of each of the nine sections into which this order is divisible are found in the Flora of China; but of the minor groups, or natural families, several, such as the *Santalaceæ, Myristicaceæ,* &c., are wanting. The following are the most important genera belonging to the various types:—

QUERCINÆ. *Salicaceæ.*—Salix fragilis, S. Babylonica. Populus.

Willows and poplars appear to be frequent in many parts of China. The latter were observed planted round burialplaces, and some of the former are mentioned as being of large size. Indeed, one of the weeping willows that was measured was found to be "fifteen feet in girth, at a man's height from the ground;" and rows of the rough-barked willow (Salix fragilis), growing to a vast size, were observed by Staunton shading the road that passed over the plain on the north of Pe-king. The situation seemed to be peculiarly favourable to them, if a judgment may be formed from their magnitude and abundance.

Corylaceæ.—Castanea vesca, C. Chinensis. Cory-

lus. Quercus densifolia, Q. cornea, Q. Chinensis, Q. dentata.

The large-leafed chestnut was often seen by our countrymen; and its fruit, which is common in the markets, is said to be well tasted. There is also a small variety, the shape of which is thought to resemble an acorn.

Abel tells us that the oak is equally prized there as in other countries for its grandeur, its longevity, and its uses. It is eulogized in the ancient books of the empire, and is emphatically designated by the natives, on account of the period it requires to attain maturity, "the tree of inheritance." In the "Mémoires concernant les Chinois," we are told that oaks 100 feet in height and 24 in circumference are frequent, and that others are recorded to have existed whose branches overshadowed an acre of ground. For building, dyeing, and fuel, they are in general use, and their various parts employed in medicine and for other purposes. The acorns in several provinces form a valuable article of food. Those of some species are esculent without preparation, while those of others must be deprived of their crudeness, after being denuded of their husks, by grinding them in a mill, and subsequent immersion in water for several days. They then afford a palatable farinaceous paste, which may be mixed with rice or wheaten flour, or even made into cakes by itself.

Oak-galls are used in medicine, and the common name for these curious productions is very expressive. When translated, it signifies "uneatable fruit."

Such is the history of the oak given by persons

who had the best means of arriving at correct information about it. Abel, in commenting on this passage, observes, he could not learn that the gentlemen of the embassy who visited the plantations of this tree near Ta-tung met with any circumstance tending either to confirm or contradict it. Of the specimens seen at the above-named place, many were remarkable for their beauty, but few for their size; the largest did not exceed fifty feet in height. But it should be remembered that this was an artificial plantation, and they were chiefly pollards, considerable quantities of their branches and trunks being accumulated for firewood, or perhaps for charring. "One of the largest and most interesting of these trees which," writes Abel, "I have called *Quercus densifolia*, was an evergreen closely allied to *Q. glauca* of Thunberg, and resembled a laurel in its shining green foliage. It bore branches and leaves in a thick head, crowning a naked and straight stem; its fruit grew along upright spikes terminating the branches. Another species, *Q. Chinensis*, growing to the height of fifty feet, bore them in long pendulous spikes." Five distinct species were found in the course of a short walk; thus affording a promise of rich rewards to those who may hereafter be permitted to investigate the botany of China.

Juglandaceæ.—Juglans regia.

Ulmaceæ.—Ulmus Chinensis, U. pumila.

Aquilariaceæ.—Aquilaria (Ophispermum, *Lour.*) Chinensis. This is one of the eagle-woods or aloe-woods held in so much esteem by Eastern nations. The fragrant substance they afford appears to be the produce of disease, for the sound wood is white and inodorous. In a morbid condition, however, it

assumes a darker colour, becomes saturated with a peculiar resinous matter, which is the perfume so highly valued. This fragrant substance is used as a stimulating medicine, as well as an ingredient in incense.

URTICINÆ. *Stilaginaceæ.*—Antidesma scandens.

Platanaceæ. Artocarpidæ.—Artocarpus integrifolia (Polyphema Jaca, *Lour.*) Broussonetia (Morus) papyrifera, Morus alba, M. rubra, M. Indica, M. Sinensis. Ficus Carica, F. simplicissima, F. Indica, F. repens, F. stipulata, F. pumila. Procris Chinensis, P. Cantoniensis. In China the paper mulberry (Broussonetia papyrifera) is cultivated as osiers are with us, and the inner bark, when stripped from the rods and separated from the cortical portion, is soaked in water until it becomes soft, and is more or less frequently sorted according to the quality of the paper to be made. It is then beaten into a pulp with wooden mallets, and, being mixed with an infusion of rice and manihot-root, the liquid paper is poured out into sheets, and when pressed the operation is complete. The refuse matters sorted from the finer and whiter papers are made into coarser kinds, and when the outer bark is not well separated, a very coarse brown article is produced.

Several species of Morus, especially M. alba and its varieties, macrophylla, nana, ovalifolia, and rosea, are cultivated to a considerable extent in many parts of China, not only for the value of their fruit, but for the sake of their leaves, on which chiefly the silkworms are fed. Beyond Sou-tcheou-fou the whole face of the country to a considerable distance presented, when Lord Amherst passed that way, a fo-

rest of mulberry-plantations, the groves of which were very thinly interspersed with any other trees.

Ficus repens varies much in appearance. When attached to walls, the leaf is small; when it surmounts them, much larger. It is so abundant about Nan-king, as almost to hide the ramparts of the city.

Urticaceæ.—Urtica nivea, U. interrupta. Boehmeria Cochin-Chinensis. Cannabis sativa. The hemp is used by the Chinese, as with us, to make ropes and various strong cloths; but its use is local,—their more favourite cordage-plant being a species of Sida, hereafter to be mentioned. From hemp-seeds oil is extracted for economical purposes; but they are also employed medicinally, as would appear from their forming one of the articles in the Chinese collection of Materia Medica, belonging to the Royal College of Physicians.

Laurinæ. *Lauraceæ*.—Laurus Camphora, L. aggregata, L. glauca. Tetranthera laurifolia, T. ferruginea. Cassyta filiformis.

The camphor-laurel is more valued in China for its timber than for the fragrant drug on account of which it is so well known in Europe. It is used in the best buildings of every kind, as well as for the masts of vessels, household furniture, and other articles; and, in short, bears too high a price to allow of any part except the branches to be cut up for the extraction of the camphor itself. The camphor-laurel grows in China to the size of our largest elms. Such trees have been actually seen by European travellers; but the Chinese affirm that it is sometimes 300 feet high, and of a circumference greater than can be embraced by the extended arms of twenty men. The largest, however, noticed by the

Macartney embassy, were about fifty feet in height, and twenty feet round.

THYMELÆACEÆ. *Elæagnidæ.*—Elæagnus latifolia, E. pungens (?). *Thymelidæ.* Trophis (Streblus, *Lour.*) cordata. Daphne Indica, D. odora, D. triflora, D. cannabina. The bark of Daphne cannabina is made into paper.

Proteaceæ.—Rhopala, Phyla Chinensis, and Dryandra cordata. This latter plant is the *tong-chou* of the Chinese, and from its seeds they extract an oil, which they use as a varnish for their boats and coarser articles of furniture. This oil is often mixed by fraudulent traders with a more valuable varnish, obtained from a species of rhus, believed by some authorities to be R. vernix, but stated by others to be an undescribed species; and the adulterated compound is then vended as the superior article. Indeed, so prone are the natives to such practices, that instead of recommending their wares, as is common with us, by boasting of their quality and cheapness, they try to recommend themselves to the customer by writing over their stalls or shops *Pou-hoa,* which means "No cheating here."

HIPPURINÆ. *Trapaceæ,* vel *Haloragеæ.*—Myriophyllum spicatum. Goniocarpus scaber, G. micranthus. Trapa bicornis, T. Cochin-Chinensis. The Chinese have two varieties of Trapa bicornis, viz. the white and the red fruited. Their large nutritious seeds are much esteemed as food; and these are some of the plants by means of which crops are grown at the bottom of ditches, ponds, and canals,—thus enabling the inhabitants to derive sustenance from situations unthought of in most other countries.

PIPERINÆ. *Saururaceæ.*—Saururus Chinensis. *Chloranthaceæ.*—Chloranthus inconspicuus, C. monostachys, C. monander.

Piperaceæ.—Piper pinnatum (?). The flowers of Chloranthus inconspicuus, or of a species closely allied to it, but differing in its white blossoms, is said to be mixed with some sorts of tea to give them a fine smell and flavour.

The cubeb grows in China; but whether the plant is native or introduced does not seem well determined. Its name, *mo-fa-coo,* is very expressive of its appearance, although the idea is not strictly true,—it signifying "fruit without flower."

ASARINÆ. *Aristolochiaceæ.*—Aristolochia Indica. Asarum Virginianum.

Nepenthaceæ.—Nepenthes distillatoria, N. phyllamphora. These curious vegetables are called *tchu-lung-tsow* by the Chinese,—a name signifying "pig-basket plant," on account of a fancied resemblance between their ascidia and the baskets in which they carry their young pigs to market.

RUMICINÆ BETACEÆ. *Chenopodidæ.*—Beta vulgaris. Atriplex. Chenopodium altissimum, C. Atriplicis. Spinacia oleracea. Salicornia. Basella nigra. *Amarantidæ.*—Amarantus tricolor, A. cruentus, A. polygamus, A. tristis, A. oleraceus, A. hecticus, A. caudatus. Celosia cristata, &c. &c. Polychroa repens. Gomphrena globosa. Cyathula geniculata. Desmochæta (Achyranthes, *Lour.*) prostrata.

Many of these plants are cultivated by the Chinese as esculent vegetables,—such especially as the common spinach and the amaranti, which are

dressed and eaten as spinach,—and others as ornaments,—such as the Celosiæ or cockscombs, of which they have several beautiful varieties.

Scleranthaceæ. Illecebridæ.—Illecebrum sessile.

Nyctaginaceæ.—Mirabilis Jalapa. Boerhaavia diffusa.

Polygonaceæ, vel *Polygoneæ.*—Polygonum Loureiri, P. emarginatum, P. Chinense, P. barbatum, P. tinctorium, P. Hydropiper, P. aviculare, P. Tataricum, P. Fagopyrum. Rumex glomeratus, R. persicarioides, R. longifolius. Rheum palmatum, R. rhabarbarum, R. undulatum. The seeds of several species of Polygonum are used as food in China, such as P. emarginatum, and P. Tataricum. The latter is indeed very extensively cultivated as a bread-corn. P. Chinense and barbatum are valued for their yielding a dye resembling indigo.

Begoniaceæ. Begonia discolor, B. grandis, B. unifolia.

Euphorbiaceæ. Euphorbia cyparissias, E. Esula, E. tithymaloides. Croton Tiglium, and four other species. Stillingia sebifera. Ricinus communis. Acalypha, three species. Phyllanthus, five species. Jatropha Janipha, J. Curcas (?). Sterculia, four species. Elæococcus Vernicia. Emblica officinalis. Bradleia Sinica. Aleurites. Agyneia impubes *et* puber. Dalechampia parvifolia. Euclea herbacea. Rottlera, two species. Excæcaria Cochin-Chinensis. Cluytia monoica. Codiæum chrysosticton. Tridismis hispida *et* tomentosa. Triadica Sinensis. Garcia nutans, and Buxus sempervirens.

The Palma Christi is cultivated in China, and was often noticed by our countrymen in large patches in the fields. The quantity grown was out

of proportion to that of the oil likely to be wanted as medicine, and it was found, on inquiry, that the Chinese seldom use castor-oil for the purposes to which it is devoted by us, but that, either from peculiarity of constitution, or the effects of soil and culture, the seeds are considered esculent by them, and the expressed oil employed for various domestic purposes. The tallow-tree (*Stillingia sebifera*) is also constantly met with, its concrete oil being a substitute for animal fat. Indeed it affords a very large proportion of the oily matter used for the purposes of illumination; and as it is a firm concrete substance, something resembling spermaceti, it is often used to coat softer kinds of grease, which may be more conveniently burned when thus encased. The banks of the canals seem to be the favourite places for planting these trees. The fatty matter procured from their fruit is firmer than tallow, and free from any offensive odour, but not equal either to wax or spermaceti.

It is said that one of the varnishes used by the Chinese for their ornamental works is made by boiling the oil of Jatropha Curcas with oxide of iron.

ROSALES.

Ilicinæ. *Aquifoliaceæ.*—Ilex Chinensis.

Celastraceæ, or *Celastrineæ.*—Euonymus europæus, E. Chinensis. Celastrus cerifera (?). Dalrymplea.

A species of celastrus, which has been called C. cerifera, but of which there is little known, is said to yield a sort of lac, called by the Chinese *pe-la*, and of which tapers or candles are made.

Rhamnaceæ, or *Rhamneæ*.—Zizyphus Chinensis, Z. jujuba, Z. albens. Z. ramosissima. Berchemia (Oenoplia) lineata. Rhamnus Theezans. R. soporifer. Hovenia acerba *et* dulcis. Opilia odorata (?). Plectronia Chinensis.

The thickened and fleshy peduncle of Hovenia dulcis is eaten and much esteemed as a fruit; its flavour is said to resemble that of the apple.

The leaves of Rhamnus Theezans, which resemble those of ordinary tea, are used, we are told by Osbeck, as a substitute for the superior article, by the poorer people in China, who call the plant *tia*. The infusion made from them is aromatic and slightly astringent.

Terebinthinæ. *Cassnoiaceæ*.—Anacardium(?). Mangifera pinnata. Rhus Javanica, R. succedanea, R. semi-alata.

The black varnish of the Chinese is, by some, said to be the produce of a species of rhus, and R. vernix has been named; but we have no evidence of that plant being found in China: others believe it to be procured from an allied genus, viz. Melanoreæa; and, according to the reports of Mr R. Smith, the Burmese varnish furnished by the M. usitata in Sylhet is very similar to, if not absolutely the same with, that of the Chinese. A varnish of an inferior kind is known to be made in China from the fruit of Rhus semi-alata. The concrete oil, procured by expression with heat from the seeds of R. succedanea, is used both in China and Japan for the purpose of illumination.

Spondiaceæ.—Spondias amara.

Burseraceæ. — Canarium Pimela, C. album. These plants, the Pimelæ alba and nigra of Lou-

reiro, are much esteemed both in China and Java for their fruits, which are used as a substitute for olives; they are pickled, and much recommended for assisting digestion and provoking the languid appetite.

Cicerinæ, or Lomentaceæ.

Lotaceæ.—Sophora Japonica. Macrotropis (Anagyris) fœtida, and inodora.

Crotalaria Chinensis. C. paniculata.

Medicago lupulina. M. falcata.

Melilotus Indica.

Trifolium globosum.

Indigofera rotundifolia. I. coccinea. I. tinctoria.

Tephrosia Chinensis.

Robinia pygmæa. R. mitis. R. spinosa. R. amara. R. flava.

Caragana Chamlagu.

Colutea.

Glycirrhiza echinata. G. glabra.

Phaca trifoliata. P. villosa.

Astragalus Chinensis. A. Sinicus.

Zornia elegans. Z. diphylla. Z. Zeylanica (?). Z. pulchella.

Æschynomene.

Lourea reniformis.

Hedysarum lutescens. H. latifolium. H. striatum. H. tomentosum. H. Gangeticum. H. triflorum.

Onobrychis crinita.

Lespedeza polystachya. L. lagopodioides.

Lathyraceæ.—Faba vulgaris.

Pisum sativum.

Abrus precatorius.

Macranthus Cochin-Chinensis.

Rhynchosia volubilis.

Phaseolus radiatus. P. Mungo.

Wisteria Chinensis. W. floribunda.

Dolichos tetragonolobus. D. Chinensis. D. unguiculatus. D. gladiatus. D. purpureus. D. biflorus. D. hirsutus. D. ensiformis. D. Catiang. D. Soja.

Pachyrhizus trilobus.

Lablab Nankinicus. L. perennans.

Erythrina Indica. E. fulgens.

Derris trifoliata.

Pterocarpus flavus.

Stizolobium pruriens.

Mimosaceæ.—Acacia Nemu (Mimosa arborea, *Lour.*) Mimosa corniculata. M. fera. Inga bigemina. Adenanthera pavonina (?). Desmanthus natans.

Cassiaceæ. Geoffroyidæ.—Arachis hypogæa.

Cæsalpinidæ.—Gleditschia Sinensis. Cassia Sophora. C. torosa. C. Chinensis. C. gallinaria. C. pumila. Cathartocarpus fistula. Bauhinia acuminata. B. scandens.

Poinciana pulcherrima. Parkinsonia orientalis.

Guilandina Bondue.

Cercis siliquastrum.

Incertæ sedis.

Phyllobium Chinense.

Many leguminous plants are cultivated by the Chinese both for ornament and use. Peas, beans, haricots, and other pulse, such as some species of dolichos (Lablab vulgaris, and Nankinicus) are grown, not only in gardens, but frequently in the

fields. Sometimes whole fields of beans were observed by Staunton; and at others the small spots accidentally left vacant near the edges of banks, or along ridges of corn, the dolichos was planted. The seeds of this plant are like those of the kidney-bean, and are usually dressed and eaten like French beans. The pods, however, are from one to two feet in length. The fleshy roots of the pachyrhizi, which resemble turnips, are much esteemed as an esculent vegetable. From the seeds of the *soja*, the peculiar savoury sauce known under the name of soy is made, and the *teu-heu* or *tau-hu*, which is a very popular dish in China, is prepared from the seeds of this plant. Other kinds are used for various economical purposes, especially for dyeing; and from the buds and tender leaves of a small species of colutea they are said to extract an excellent green dye. The resinous juice of Æschynomene grandiflora forms one of their varnishes; and another species of this genus has been referred to as affording that peculiarly beautiful substance called rice-paper. But although the rice-paper, or the solat-plant of the East Indies, has been ascertained to be an Æschynomene, viz. Æ. paludosa, yet it is more than suspected that the Chinese derive their rice-paper from another source; probably, as Lindley suggests, from some malvaceous plant.

The Aloexylon Agallochum is the plant from which they are said to procure the aloe-wood already mentioned, and which in Eastern nations is held in such great esteem as occasionally to be valued at more than its weight in gold.

Rosinæ. *Prunaceæ*, or *Amygdaleæ*.—Amyg-

dalus communis, A. Persica, A. pumila. Prunus Armeniaca. Cerasus serratula, C. Salacina, C. Pseudo-cerasus.

The last-named species of cherry is the *yung-to* of the Chinese. It has only within a short time been introduced into this country; but it promises to become a valuable addition to our stock, as it bears forcing well, yields abundant crops, and the fruit has a pleasant flavour. As already observed, the varieties of stone-fruits cultivated by that people form a very meagre catalogue when compared with those which are familiar to us; and their modes of preparation, as well as the uses to which they are applied, seem to be few. The natives, however, are not insensible to the charms of European luxuries; and Abel tells us, that "the embassy found in every part of China cherry-brandy to be the most seducing cordial that they could offer to a Chinese palate." Plums and peaches are more or less frequently brought to table as a dessert; and they have a favourite variety of peach which is flat. They call it *pin-tow*. It is propagated by grafting, but the crops are very precarious.

Pyraceæ, or Pomaceæ. Pyrus communis, P. Sinensis, P. spectabilis. Cydonia vulgaris, C. Japonica, C. Sinensis. Eriobotrya Japonica. Mespilus Pyracantha. Raphiolepis (Cratægus) salicifolia, R. rubra. The *lo-quat* of China and Japan is the fruit of the eriobotrya. It has an agreeable smell and flavour, something resembling an apple. It is held in much esteem by the Chinese; and Sir Joseph Banks says it is as good as the mango. Modern travellers do not speak in terms of much commendation of their apples and pears; but

Marco Polo tells us that in his time they had pears white inside, fragrant, melting, and of the enormous weight of 10 lbs. each.

Rosaceæ.—Fragaria vesca. Potentilla fruticosa. Rubus, five species. Rosa, numerous species, and almost innumerable varieties (see page 317).

Spiræaceæ.—Spiræa chamædryfolia, S. palmata. Kerria Japonica.

Myrtinæ. *Punicaceæ.*—*Granatidæ.*—Punica Granatum, var. β flore albo. γ flore pleno.

Calycanthidæ.—Chimonanthus fragrans. β grandiflorus.

Myrtaceæ.—Myrtus tomentosa. M. Chinensis. M. affinis. Eugenia Malaccensis (cult.) E. uniflora. E. microphylla. Bœckia frutescens. Psidium Cattleyanum, P. pyriferum, P. pomiferum, P. caninum. Melaleuca (?). Metrosideros vera.

Gustaviaceæ Barringtonidæ.—Barringtonia speciosa.

Melastomaceæ.—Melastoma sanguineum, M. dodecandrum, M. Malabathricum. Osbeckia Chinensis, O. heterantherum.

Metrosideros vera is the iron-wood of which the Chinese are said to make anchors and rudders; and with the bark of a species of Melaleuca they form a substitute for oakum, in caulking their boats. This bark is also employed instead of tiles or slates in roofing houses, and the leaves of the tree are taken in decoction as a tonic medicine. The leaves of Melastoma Malabathricum afford a serviceable black dye. The seeds of Barringtonia speciosa have a narcotic power, and inebriate fish when mixed with bait, like Cocculus Indicus.

ONAGRINÆ. *Combretaceæ.*—Quisqualis glabra.

Rhizophoraceæ, or *Rhizophoreæ.*—Rhizophora (sp.?).

Lythraceæ, or *Salicareæ, Lythridæ.*—Lawsonia (?). Ammania baccifera. *Lagerstroemidæ.*—Lagerstroemia Indica, L. Munchausia.

Onagraceæ, or *Onagrarieæ.* Epilobium angustifolium. Gaura Chinensis. Jussieua tetragona.

CRASSULINÆ. *Hydrangeaceæ.*—Hydrangea hortensis.

Hamameliaceæ.—Hamamelis Chinensis.

Saxifragaceæ. Saxifraga sarmentosa (Chinensis, *Lour.*) S. cuscutiformis.

Crassulaceæ.—Sedum stellatum, S. Anacampseros. Crassula pinnata, C. spinosa. Kalanchoe spatulata, K. ceratophylla. Verea nudicaulis.

The expressed juice of the leaves of the house-leek (sedum), as well as that of Cotyledon spinosa, is used by the females to anoint or rather dye their hair, as it imparts a fine glossy black tint, and is said to prevent baldness. The Hydrangea, which we have received from China and Japan, has not hitherto been found in either country in a wild state.

GROSSULINÆ. *Nopalaceæ,* or *Opuntiaceæ.*—Cactus triangularis (? native). Cereus undatus.

The cacti are planted by the Chinese on the tops of their houses, from a superstition prevalent among them of their potency in warding off evil spirits, or, as they say, to drive off devils.

Homaliaceæ, or *Homalineæ.*—Blackwellia grandiflora. (Astranthus Cochin-Chinensis, *Lour.*)

Passifloraceæ.—Passiflora Chinensis, P. cerulea (?).

CUCURBITINÆ. Tricosanthes anguina. Bryonia

umbellata. Momordica Luffa, M. Charantia, M. cylindrica. Luffa fœtida. Cucumis sativus, C. Melo, C. acutangulus, C. Maderaspatanus (?). Cucurbita lagenaria, C. Pepo, C. Melopepo, C. Citrullus. Muricia Cochin-Chinensis. Benincasa cerifera. The last-named plant is the tallow-gourd of China. Its fruit is scarcely esculent; but it is remarkable for having its surface, when mature, covered with an exudation resembling wax, and which has something the smell of common rosin. A species of momordica is cultivated as an esculent vegetable.

Red and white water-melons are to be met with at Canton and Macao; but they are not well flavoured in the southern parts of the empire, neither are they easily raised.

PAPAYACEÆ. Carica Papaya. The fruit of the common papaw is about the size of an ordinary melon; it is esculent and wholesome, but not very palatable. The seeds, which are warm and biting like cress, are eaten by the Chinese. The plant is also cultivated in many of our Indian possessions, and eaten both raw and cooked. It is usually gathered when about half grown, and soaked in water to withdraw the acrid milk with which it abounds, and, when properly prepared, used as a substitute for mangoes. The exhalations from the papaw are said to have the very singular property of intenerating the toughest animal matter; and hence it is sometimes made economically useful, inasmuch as newly-killed meat suspended amongst its leaves soon becomes tender. Even old hogs, and antiquated cocks and hens, if fed upon the leaves and fruit, become in a short time as tender as young pigs and pullets.

LORANTHINÆ. *Loranthaceæ.*—Loranthus Scurrula. Viscum (?).

ANGELICINÆ, or *Umbelliferæ.*—Hydrocotyle asiatica, H. Chinensis. Sium Sisarum, S. Græcum. Caucalis orientalis.

Daucus Carota. Cnidium Canadense. Coriandrum sativum. Fœniculum vulgare. Apium graveolens.

A species of sium, which to European nostrils is thought a most stinking weed, is nevertheless so much relished by the Chinese, as to be chopped up and eaten like parsley.

ARALINÆ. *Corneaceæ.*—Marlea begoniæfolia.

Araliaceæ.—Aralia scandens, A. octophylla (var. palmata, *Lour.*) Panax fruticosus, P. aculeatus. The root of Panax fruticosus is frequently substituted for that of P. quinquefolius, the former being a native of China, the other growing chiefly in Tartary. This plant is the celebrated ginseng, concerning which such strange and extravagant tales have been told. From immemorial ages it has been extolled as a panacea or universal medicine; whence its present generic name, which signifies a remedy for all things. Père Jartroux says, that the most celebrated physicians of China have written volumes on the *Gen-seng*, which they affirm to be able to ward off or to remove fatigue, to invigorate the enfeebled frame, to restore the exhausted animal powers, to make old people young, and, in a word, to render man immortal; this saving clause being, however, added, by the more cautious,—"if any thing on earth can do so." Hence the name, *Gen-seng*, *Jin-chen*, or *Nind-sin*, like our modern botanical term, signifies the "wonder of the

world," or "the dose for immortality." Osbeck says they take it every night and morning in their tea or soup, and that he never looked into the apothecaries' shops but they were always selling ginseng. The plant grows in several provinces of the empire, as in the mountains of Shan-tung and Leaò-tong; and the herbalists are jealous of its being gathered at any other time save on the first ten days of the second, fourth, and eighth months. The chief supplies, however, are derived from Tartary, and the venders magnify the difficulties and dangers encountered by those who collect it, with the design, perhaps, of increasing its value. Du Halde says the deserts in which it grows are strictly guarded, and that trespassing on the grounds, or fraudulently digging up the roots, are highly penal offences. Ten thousand Tartars, we are told, were once employed by the emperor in searching for it, and that six months were spent in collecting 20,000 Chinese pounds.

VITINÆ. *Leeaceæ.*—Leea spinosa (Aralia Chinensis, *Lour.*)

Viteaceæ, or *Viniferæ.*—Vitis vinifera. Cissus umbellata.

Meliaceæ, Melidæ.—Melia Azedarach. Amsora cucullata(?). *Cedrelidæ.*—Cedrela rosmarinus. The azedarach is one of the largest timber-trees in the neighbourhood of Canton, and its wood is highly valued, and more generally used than any other in the construction of household furniture and fine works of every kind.

CISTINÆ. *Hypericaceæ.*—Hypericum Chinense, H. monogynum, H. patulum (*Lour.*) Vismia dealbata, V. Cochin-Chinensis.

Garciniaceæ.—Garcinia Mangostana. The bark of the mangostan is astringent, and is used medicinally in bowel-complaints. The dyers value it as a mordaunt for black.

Violaceæ.—Viola odorata, V. primulæfolia.

Droseraceæ.—Drosera umbellata.

Bixaceæ.—Bixa Orellana.

Tamaricaceæ.—Tamarix Chinensis.

DIANTHINÆ. *Dianthaceæ* or *Caryophylleæ.*—Lychnis grandiflora, *vel* coronata. (Hedona Sinensis, *Lour.*) Cerastium repens (? arvense). Deutzia scabra. Mollugo triphylla. Lechea Chinensis. Dianthus Chinensis, D. caryophyllus, D. Japonicus, D. cephalotes, D. arbuscula.

GERANINÆ, or GRUINÆ. *Oxalidaceæ.*—Oxalis corniculata. Biophytum sensitivum. Averrhoa Carambola.

BALSAMINACEÆ. Impatiens cristata, I. cochleata. Balsamina Chinensis.

Geraniaceæ.—Erodium Ciconium.

MALVINÆ. *Malvaceæ, Malvidæ.*—Malva Mauritanica, M. glabra, M. verticillata. Reevesia thyrsoidea. Urena procumbens, U. lobata. Malachra Urena. Althæa Chinensis, A. rosea. Hibiscus manihot, H. acerifolius, H. Syriacus, H. Trionum, H. rosa Sinensis, H. mutabilis, H. esculentus, H. ochra. Sida lanceolata, S. orbiculata, S. tiliæfolia. Gossypium herbaceum, G. religiosum.

Bombacidæ.—Helicteres angustifolia, H. hirsuta. Bombax orientale, B. Ceiba.

Several malvaceous plants, especially species of sida and gossypium, are of great economical importance to the Chinese, as affording them a substitute for hemp; cotton of the common, and of the pecu-

liar kind known under the name of Nan-king; and the best rice-paper is also believed to be the produce of one of this tribe.

The cotton-plants are cultivated to a great extent in China; and we are told that the peasants adopt the plan of breaking off the tops of the branches, in order, by checking the axial development, to increase the number of the pods, and hasten their production. The coloured cotton grown in the neighbourhood of Nan-king is said by some persons to be the produce of Gossypium religiosum; but the inhabitants tell us, that "the colour as well as superior quality of the cotton growing in the province of Kiang-nan, of which Nan-king is the capital, is supposed by them to be owing to the peculiar nature of the soil; and it is asserted that the seeds of the cotton degenerate when transplanted to another province, however little different the climate."

Sida tiliæfolia, the *xing-ma* of the Chinese, is the common hemp-plant of their country. It is very extensively cultivated, and large tracts were seen covered with it by Abel, on the banks of the Pei-ho, in the neighbourhood of Tong-tcheou, and also in the vicinity of Tien-sing, as well as in other places. The root of the xing-ma is esteemed by them as a sudorific.

Several species of Hibiscus are cultivated as ornamental plants. The petals of H. Rosa Sinensis are employed by the Chinese to prepare a black dye, with which they not only stain their eyebrows, but also polish their shoes; and the mucilage extracted from the roots of H. manihot is used by them as size. The seed-vessel of H. ochra is eatable; its flavour is like that of white of egg.

Bromaceæ, or *Sterculiaceæ*, *Dombeyidæ*.—Pentapetes Phœnicia.

Hermannidæ.—Waltheria.

Buttneridæ.—Buttneria (herbacea ?). From the fibres of a species of Waltheria, of which Mr Reeves has a drawing, they make fine cloth.

The cocoa or rather cacao plant is cultivated in China, but it is not a native.

Tiliaceæ, *Tilidæ*.—Grewia nitida, G. affinis, G. microcos, G. asiatica. Corchorus capsularis.—Vatica Chinensis. *Elæocarpidæ*.—Elæocarpus sylvestris.

Theaceæ, *Ternströmidæ*.—Ternstromia. Eurya Chinensis.

Camellidæ.—Camellia Japonica, C. oleifera, C. Sesanqua, C. euryoides, C. reticulata. Thea Chinensis, *vel* Cantoniensis. α viridis. β nigra. T. Bohea, T. oleosa. Gordonia (Camel. affin. Del.)

The Chinese have between thirty and forty cultivated varieties of Camellia Japonica, which vary in colour, degree of fulness, &c.—this beautiful plant being as much esteemed by their florists as by ours.

The *tcha-yeou*, or oil-bearing tea-plant, which was considered by the naturalist accompanying Lord Macartney's embassy as the C. Sesanqua, is believed by Abel to be a distinct species, now called C. oleifera. From its seeds are extracted large quantities of a bland fixed oil, fit for table use as well as for burning.

To persons not familiarly acquainted with the narrow-minded policy of the Chinese, in restricting the communication of foreigners with natives, and prohibiting naturalists from visiting and making observations in the different parts of the country; the uncertainty which still prevails as to the plants

from which our ordinary tea is procured must appear most strange. It does seem, indeed, almost a paradox, that tea should have been our common beverage for upwards of a century; that we should now consume about forty millions of pounds per annum; and yet that we should be unable to determine whether the two chief kinds, the black and the green (to say nothing of the minor varieties of each class), are produced by the same or by different species. Yet although such is the case, the dispute is now one rather of words than facts, and chiefly turns upon what degree or amount of difference should be admitted as forming a specific distinction. One important step towards clearing away doubt, and solving the problem, has been made by the determination that the plant called Thea Bohea by botanists, and which was so named because at one time it was supposed to be the source of the Bohea teas of commerce, does not afford any of the teas imported into Europe; or if it enters at all into their composition, it is in very small quantities, and is most probably accidental. The real tea-plants are two in number, whether species or varieties is not absolutely determined, but which are so different, that were it not for the assertion that they are convertible into each other by change of soil and culture, they would be considered specifically distinct. These are the varieties *viridis* and *nigra* of De Candolle's Thea Chinensis, *vel* Cantoniensis.

Mr Reeves, whose peculiar opportunities of gaining information, and whose readiness to impart it, have been already mentioned, is decidedly of opinion, that the black and green tea-plants are quite

distinct; and Royle, who, in his beautiful Flora of Cashmere, has discussed the subject, considers their difference as specific. Don, however, and others, hold a contrary doctrine, which is favoured by the assertion, that, "if a green-tea plant be transported to a black-tea district, it will then bear black-tea leaves; and that the contrary occurs when black-tea plants are carried to green-tea districts." And this account even Abel confirms; for although he collected specimens of two distinct species of tea, yet, he adds, that from persons perfectly conversant with the Chinese method, he learned that either of the two plants will afford the black or green tea of the shops, but that the broad thin-leaved plant is preferred for making the green-tea." This (adds Royle) is in conformity with the information communicated to Dr Hooker, and also with that originally given by Mr Pigou, on the authority of a Chinese who had been eight times in the bohea-country, remaining there from four to six months each time; and who stated, that "bohea may be cured as hyson, and hyson as bohea." To this Mr Reeves replies, that "the Chinese manufacturers do not, and *they* say they cannot convert black-tea into green, and *vice versa*; and this I believe to be true; indeed, the colour of the infusions is alone sufficient evidence." The discrepancy in the information, Mr Reeves explains, by adding, that "there is a species of tea grown in the province of Quang-tung of a pale-coloured leaf (occasionally mixed with congo tea, to make the tea imported under the name of bohea); and this tea can be coloured and made up to imitate various qualities of green-tea, and large quantities are yearly thus made; but

still it is only an appearance that can be given; the deception is detected as soon as it is put into water."

The statement now given is important, as it may reconcile the apparent discrepancies so much lamented. The species he mentions as being grown in the neighbourhood of Canton, is probably Abel's second species. And although Mr Reeves emphatically insists on the impossibility of converting *black-tea* into *green*, and, in a communication published in Loudon's Gardeners' Magazine, expresses his surprise "that any person who has been in China, or indeed any one who has seen the difference in the colour of the infusions of black and green tea, could for a moment suppose that they were the produce of the same plant, differing only in the mode of curing, particularly as they do not grow in the neighbourhood of each other;" still he does not deny that they may be varieties of the same species. He asserts that they are not the produce of the same *plant*, and that the leaves of the *two different plants* cannot be converted into *black* and *green* teas indifferently by curing. Both these propositions may be safely allowed to be correct, and the greatest confidence may be placed in the accuracy of Mr Reeves' observations. Still they are not incompatible with the truth of the other propositions, that the black and green tea-plants are but varieties of one and the same species, and that the qualities of the leaves of this species are affected by differences of soil and culture; so that if a plant which in the southern provinces of China produces leaves from which black-tea may be prepared, the same plant, when transferred to the northern districts, may, from

the differences of heat, light, soil, and culture, produce leaves from which green-tea may be made. This change may or may not be a sudden one. Probably it requires time to reconcile either plant to the change, for that of the green-tea seems to be hardier than the black one. As to the change in sensible properties, it is not greater, nor even so great, as that which is familiar to us in many domestic plants, such as endive, celery, sea-kale, and similar vegetables.

Abel, after refuting the vulgar notion that drying the leaves on copper produces the difference between the black and green teas, goes on to argue, that the difference may in some measure depend on the age of the leaves and the degree of heat to which they are exposed during the process of exsiccation. He says, "As the colour and quality of the tea does not, then, depend upon the difference of the species, it must arise from some peculiarity in the mode of manufacturing them. Drying the leaves of the green-tea in vessels of copper has been supposed, but apparently without foundation, to account for the difference of colour. Without going into the supposition that any thing extraneous or deleterious is added, both the differences of colour and quality may perhaps be explained, by considering one of the known circumstances attending its preparation, viz. the due management of the heat used in drying the plant. There can be little doubt that a leaf dried at a low heat will retain more of its original colour, and more of its peculiar qualities, than one which has suffered the influence of a high temperature. Supposing, then, the leaves of the same species or variety of the tea-plant to have undergone such dif-

ferent degrees of heat in their preparation, their peculiar properties would be expected to occur of greatest strength in those of the greenest colour; or (in other words, in those in which the vegetable principles had undergone the least change in the course of their preparation, *i. e.*) in those to which both Chinese and Europeans attribute the most powerful properties,"—a difference exactly analogous to that familiar to us in our pale and high-dried malt, which impart such different colours to our ales and porters; add to the above, the age of the leaves, the positive differences of the varieties grown in the black and green-tea districts, and sufficient cause will be apparent for the difference observable in the black and green teas of commerce. Abel concludes this part of his inquiry by observing, " that by far the strongest tea which he tasted in China, called *Yu-tien*, and used on occasions of ceremony, scarcely coloured the water. On examining it with a view to ascertain the form of the leaves, they were found to consist of the scarcely-expanded buds of the plant."

In conclusion, it may be observed, that the word *tea*, as universally adopted by European nations, is only a corrupt provincial pronunciation of the proper name of this plant, which is *Tcha*. In two cities only of the province of Fo-kien is it called *tea*; we also learn that our Bohea tea is a corruption of the Chinese *Vo-ee-cha*.

RANUNCULINÆ. *Menispermaceæ*.—Menispermum tinctorium, M. ovalifolium, M. hexagonum, M. trilobum. Euclea pilosa. The roots of M. tinctorium are used as a yellow dye, but the colour they afford is inferior to turmeric.

Berberaceæ, or *Berberideæ*.—Nandina domestica. Berberis Chinensis.

Anonaceæ.—Anona squamosa, A. muricata. Unona adorata, U. discolor. Artabotrys odoratissimus. Guatteria rufa.

Magnoliaceæ, *Magnolidæ*.—Magnolia conspicua (*vel* Yulan), M. obovata, M. tomentosa, M. pumila, M. fuscata, M. purpurea, M. Coco, M. inodora. Michelia Figo, M. Champaca. *Illicidæ*.—Illicium anisatum. The *tsin-y* of the natives, the bark of which is valued as a febrifuge by their physicians, is the *Magnolia Yulan*. The bark of *Michelia Champaca* is also bitter: its fruit, however, is eatable. *Illicium Anisatum* is known in commerce as Chinese anise, the capsules having the odour and flavour of that spice, for which it is used as a substitute in China, and is much esteemed as a condiment.

Dilleniaceæ.—Delima. Trachytella Actæa.

Ranunculaceæ.—Ranunculus sceleratus, R. pilosa, R. Cantoniensis. Tsopyrum adoxoides. Thalictrum Sinense. Actæa aspera, A. Sinensis. Delphinium Chinense. Clematis Chinensis, C. ternifiora, C. florida, C. minor, C. brevicaudata, C. heracleifolia.

Pæoniaceæ.—Pæonia moutan, P. albiflora. The moutan is the especial favourite of the Chinese florists, and by their poets it is as much celebrated as the rose has been by us. Their gardeners claim the honour of having rendered it suffrutescent by skill and care. Besides *moutan*, it is sometimes called *fa-wang*, or king of flowers, on account of its surpassing beauty, and also *pe-leang-king*, or hundred ounces of gold, on account of the enor-

mous prices occasionally given for it by the curious. The double yellow is the most rare and costly variety.

The Chinese name for Actæa aspera signifies "tin-clean," being indicative of the domestic purposes for which, by the roughness of its leaves it is fitted, and to which it is applied.

Nelumbiaceæ.—Nelumbium speciosum. The uses, the beauty, the economical value, and the extensive culture of this plant, the *lien-wha* of the country, have been already noticed.

Nymphæaceæ.—Nymphæa pygmæa. Euryale ferox.

Rhæadinæ. *Papaveraceæ.*—Papaver somniferum. Chelidonium majus. Argemone Mexicana. Macleya (Bocconia) cordata.

Although the opium-poppy is a native of China, it does not appear to be cultivated there to any extent; and probably as the use of opium is forbidden by law, the growth of the plant may be restricted by penal statutes. This drug is, however, consumed extensively as a luxurious stimulant, and used as a substitute for spirituous liquors to produce intoxication. The importation of it, as elsewhere observed, is expressly prohibited; not however on commercial or political, but on moral grounds. Yet the temptations of pleasure are stronger than the arm of the law. Opium is as necessary to a Chinese mandarin as Claret or Burgundy to an English gentleman; and the contraband trade in this drug is very extensive, amounting to about fifteen millions of dollars yearly.

Argemone Mexicana is a common weed in the streets of Canton.

Fumariaceæ.—Corydalis spectabilis.

Brassicaceæ, or *Cruciferæ.*—Sinapis brassicata, S. integrifolia. Brassica oleracea, B. Chinensis, B. violacea. Raphanus sativus, R. biarticulatus. Hutchinsia petræa. Capsella Bursa pastoris. Lepidium latifolium. Cardamine Chelidonia. Ricotia Cantoniensis. Nasturtium Indicum, N. microspermum, N. amphibium. Sisymbrium atrovirens. Arabis Sinensis.

This peculiarly innocuous and esculent group afford the Chinese many of their ordinary vegetables as it does almost all other nations. They, like us, have their varieties of coleworts, cresses, and radishes; indeed, of the latter, the varieties are very similar to those we cultivate in Europe; for, in their catalogues are enumerated Raphanus Radicula, R. oblongus, R. rotundus, R. griseus, R. niger, &c. &c.

Capparidaceæ, Cleomidæ.—Cleome viscosa. *Capparidæ.*—Capparis Cantoniensis. Cratæva (Capparis, *Lour.*) falcata.

Resedaceæ.—Reseda Chinensis, R. odorata. The latter species has only been seen in a cultivated state, and has not been found wild in China.

Polygalaceæ.—Polygala glomerata, P. Sibirica, P. Chinensis. Salomonia Cantoniensis, S. petiolata.

Rutinæ. *Aurantiaceæ.*—Citrus decumana, C. Aurantium, C. Limonum, C. medica, C. nobilis, C. Madurensis, C. Margarita, C. fusca, C. buxifolia. Limonia (Glycosmis) citrifolia. Cookia punctata, C. anisata. Triphasia trifoliata. Murraya exotica, M. paniculata. Aglaia odorata (?).

China is proverbially famous for its oranges, and some of the varieties cultivated there seem, from

the reports of residents at Canton and Macao, to be delicious beyond any thing that can be conceived by those who have only eaten this fruit in England. The groves of orange-trees, rose-apples, and bananas, are frequent, and give a surpassing splendour and luxuriance to all the districts in which they grow. The varieties are too numerous even to repeat their names. Some are smaller than our Portugal oranges, some as large as any produced in the West Indies; but the sweetest and richest is the mandarin, a deep-red orange, preferred to every other, and easily distinguishable by the pulp adhering to the rind only by a very few slight fibres. The monstrous fingered lemon, the *phat-thu* of the country, also deserves notice; its carpels grow more or less distinct, and are severally covered with rind. The orangines, which by some persons are believed to be the real China oranges, are the fruit of Limonia trifoliata. Cookia punctata is the *wam-pu* of the natives, and is to be met with in great abundance in their markets. Murraya exotica and paniculata are also esteemed, both for their fragrant flowers and pleasant fruits, which taste something like gooseberries.

Citrus decumana is the *shaddock*, so called from the captain who first introduced it into the West Indies from China. It is a large and very handsome fruit, but in flavour inferior to the true oranges, and very far inferior to the mandarin, which is the Citrus nobilis. There is a variety of orange called Citrus apetala, mention of which must not be omitted, as it is remarkable, not only for the loss of its petals, but also for its destitution of seeds. The flowers of aglaia odorata, which are very fragrant, are said to

be used by the Chinese to scent some varieties of tea.

Rutaceæ, Rutidæ.—Ruta angustifolia (Chalepensis, *Lour.*) Jambolifera Chinensis (Cyminosma odorata). *Zanthoxyleæ.*—Xanthoxylum nitidum, X. Avicennæ, X. Clava Herculis. Aclanthus glandulosa. Brucea Sumatrana.

Zygophyllidæ.—Tribulus terrestris.

Acerinæ. *Hippocrateaceæ.*—Tonsella (Salacia, *Lour.*) Chinensis.

Pittosporidæ, or *Pittosporeæ.*—Pittosporum Tobira.

Sapindaceæ.—Sapindus abruptus, S. cardiospermum. Koelreutera paniculata. Euphoria (Dimocarpus) Litchi, E. Longan.

SYRINGALES.

The monopetalous dicotyledons, although absolutely less numerous than the polypetalous ones, still are not proportionally less so, and form no inconsiderable part of the known Flora of China. The following are examples of the principal natural groups:—

Rubiacinæ. *Caprifoliaceæ, Loniceridæ.* Caprifolium Japonicum, C. longiflorum, C. Chinense. Lonicera Periclymenum, L. flexuosa. Abelia Chinensis. *Sambucidæ.*—Sambucus Chinensis. Viburnum odoratissimum.

Cinchonaceæ.—Psychotria Reevesii. Nauclea Adina, N. adinoides. Mussænda pubescens, M. Chinensis. Melodinus (Monogynus?). Webera (corymbosa?). Pæderia fœtida. Spermacoce. Dentella (Oldenlandia) repens. Randia Sinensis. Solea heterophylla.

Canthium Chinense, C. parviflorum. Serissa fœtida. Gardenia scandens, G. radicans, G. florida, β flore pleno, G. Chinensis, G. amœna. Genipa esculenta. Vangueria edulis (?), Hedyotis hispida, H. paniculata. Ixora blanda, I. rosea, I. crocata, I. novemnervia, I. coccinea, I. Pavetta. Pavetta arenosa, P. parasitica. Cephalanthus montanus, C. occidentalis. Acrodryon (Cephalanthus) orientale. Ophiorhiza Mungos. The root, or rather the rooting stem, of the last-named plant is believed to be the *chyn-len* of the Chinese, which they regard as little inferior in its properties to their famous ginseng. It is much extolled by their physicians, and sold at an exorbitant price, far beyond its real worth, for it is simply a powerful bitter. In India it is used as an antidote to the bites of poisonous serpents. The fruit of Vangueria edulis is about the size of a cherry, of a yellow colour and pleasant taste. It is commonly met with in China. The seed-vessel of one, if not more, species of Gardenia is used to dye yellow.

RUBIACEÆ.—Rubia cordifolia. Galium tuberosum, G. Chinense. Crucianella angustifolia. The turgid roots of Galium tuberosum abound with farina, and the plant is cultivated in China as a dietetic vegetable. Loureiro says, that the tubers, when boiled, are esteemed both wholesome and nutritious.

VALERINÆ. *Dipsaceæ.*—Asterocephalus (scabiosa) Cochin-Chinensis.

ASTERINÆ, or COMPOSITÆ. *Cichoraceæ.*—Cichorium endivia. Borkhausia repens. Leontodon Chinensis. Lactuca sativa. Sonchus oleraceus, S. Floridanus, S. Sibiricus, &c. &c. (see page 322.)

Asteraceæ, or *Corymbiferæ.*—Anthemis apiifolia.

Cotula cuneifolia, C. minima. Matricaria Cantoniensis. Pyrethrum Parthenium. Xeranthemum Chinense. Chrysanthemum Indicum, C. Sinense. Solidago decurrens, S. Cantoniensis, S. Virgaurea. Tussilago Farfara. Senecio divaricatus, S. speciosus. Inula Japonica. Buphthalmum oleraceum. Helianthus Cochin-Chinensis. Coreopsis leucorhiza. Tagetes patula. Xanthium strumarium, X. orientale. Baccharis Dioscoridis, B. Chinensis. Artemisia Judaica, A. abrotanum, A. annua, A. vulgaris, A. Chinensis, A. tenuifolia, A. capillaris, A. integrifolia, A. Moxa. Aster Indicus, A. hispidus. Callistemma hortensis, with one or more species of several other genera (see page 323.)

Cynaraceæ, or *Cynarocephalæ*.—Carthamus tinctorius. Cirsium (Carduus) lanceolatum, C. tuberosum. Serratula tinctoria, &c. &c.

From the Carthamus tinctorius the Chinese prepare some of their finest red dyes and pigments. The downy cuticle of many thistles, and the velvet-like pubescence of various artemisiæ, they use as wicks for lamps and candles, tinder, &c.; and also employ these vegetable amianths to relieve rheumatic and other pains, under the name of moxæ; and that species of artemisia most commonly preferred by the physicians is called A. Moxa. They do not, however, depend wholly on the counter-irritation which this form of cautery produces, but endeavour likewise to act forcibly on the imagination of the poor ignorant sufferers they meet with; for Abel tells us, he learned that the part to which the moxa was to be applied is often in the first place pricked with gold pins; and that itinerant practitioners in the north of China set fire to it with much

ceremony, by the assistance of a concave mirror of ice.

The endive, lettuce, and other cichoraceous plants, are cultivated in China as esculent vegetables. Buphthalmum oleraceum is also said by Loureiro to be eatable, although its leaves are too strongly aromatic to be agreeable to a European palate. The different species of aster and chrysanthemum have long been cultivated by the native florists with marked success. The beautiful varieties of China aster (Callistemma), and those splendid forms of chrysanthemum which give such brilliancy and beauty to our gardens in autumn, have been principally procured from China. They have at least forty-four well-marked varieties of Chrysanthemum Sinense, and eighteen of C. Indicum. The popular names by which these varieties are distinguished show a curious coincidence in the unscientific nomenclature of China and Britain, at least as far as florists are concerned. A few may be cited as examples. *Kuck-faa* is the ordinary name of Chrysanthemum Indicum. The following are the distinctive appellations of some of the more choice varieties:—*Foo-chow-whong*, tiger's claw; *ma-yu-wong*, horse's ear; *ngun-chun-pak*, white silver needle; *sin-foo-chow*, new tiger's claw; *kum-fung-mow*, golden-feathered; *tsoo-yeung-fei*, the two latter words or syllables are the name of a celebrated Chinese lady, and the first signifies intoxicated or enraptured.

CAMPANULINÆ. *Goodeniaceæ, Scævolidæ.*—Scævola (Koenigii?).

Campanulaceæ, Campanulidæ.—Phyteuma bipinnata. *Lobelidæ.*—Lobelia Chinensis, L. campanuloides.

ERICINÆ. *Vacciniaceæ*.—Vaccinium formosum, V. orientale. The first-named species is esteemed a sacred plant in China; its flowers are gathered by the devout at the opening of the new year, and placed as offerings in their temples.

Ericaceæ.—Andromeda Japonica. Azalea Indica, A. ledifolia. Encyanthus biflorus, E. quinqueflorus, E. reticulatus.

These latter plants, like the Vaccinium formosum, seem to be held in a kind of veneration by the Chinese, and their flowers would appear to be considered acceptable oblations to their gods; for at festivals, especially at the beginning of the year, large branches are deposited before the shrines.

STYRACINÆ. *Styraceæ*.—Symplocos Sinica.

Sapotaceæ.—Mimusops. Achras Sapota. Sideroxylon Cantoniense.

Ebenaceæ.—Diospyros Kaki, D. vaccinioides. The fruits of several species of Diospyrus are esculent. By the Chinese they are eaten both raw and dried. In the latter state they are often brought to Europe, and are known to us under the name of *date-plums*.

MENTHINÆ. *Gesneriaceæ*.—Picria Fel terræ.

Orobanchaceæ.—Orobanche cœrulea.

Acanthaceæ, Acanthidæ.—Acanthus ilicifolius. Barleria procumbens. Thunbergia grandiflora (cult.), T. angustifolia. Incarvillea Chinensis. Harrachia (Crossandra, *Lour.*) speciosa. Lepidagathis repens. Justicia ventricosa, J. Chinensis (?), J. paniculata, J. nigricans, J. bicolor. Hypoestes purpurea. *Sesamidæ*.—Sesamum orientale.

J. paniculata is the *hoang-lien* of the Chinese. It has been much celebrated as a stomachic, and is

used as a remedy in cholera, dysentery, and intermittent fevers.

Bignoniaceæ.—Tecoma (Bignonia) grandiflora, B. undulata.

Verbenaceæ.—Verbena officinalis. Cornutia quinata. Gmelina. Vitex ovata, V. Negundo, V. incisa, V. spicata, V. trifolia. Clerodendron fortunatum, C. infortunatum, and five other species. Callicarpa rubella, and three other species.

Menthaceæ, or *Labiatæ.*—Rosmarinus officinalis. Scutula scutellata. Stachys. Leonurus Sibiricus. Leucas Chinensis. Mentha aquatica, M. hirsuta, M. crispa, M. Canadensis, M. Pulegium. Teucrium Polium. Ajuga reptans. Betonica officinalis. Barbula Sinensis (?). Lamium Garganicum. Melissa Cretica. Origanum dictamnus, O. Creticum, O. heracleoticum, O. Majorana.

Utriculariaceæ.—Utricularia bifida.

Scrophulariaceæ.—Digitalis Chinensis. Mazus rugosus. Gerardia glutinosa. Buchnera Asiatica. Morgania hyssopioides, M. lucida (Wedgelia Corœensis, Xenopoma?).

Solaninæ. *Solanaceæ.*—Solanum nigrum, S. Melongena, S. Æthiopicum, S. biflorum. Physalis Alkekengi. Lycium barbarum, L. Chinense, L. turbinatum, L. Treivianum. Capsicum Sinense, C. annuum, C. baccatum, C. frutescens. Datura ferox, D. Metel. Nicotiana Chinensis, N. fruticosa (Chinensis, *Fisch.*)

Solanum Æthiopicum is cultivated in China for the sake of its fruit, which is prized by the mandarins, and finds its way as part of the dessert to the tables of the great.

The use of tobacco not being known in Europe

before the discovery of America, and the practice of smoking and snuff-taking having been adopted by us from our transatlantic brethren, it has been generally supposed that the plants were likewise all introduced into the Eastern from the Western hemisphere, and that we have no indigenous species of tobacco in the Old World. This opinion is, however, erroneous, as several have been found, viz. one in India and two in China, under circumstances which can leave no doubt of their being native plants. Smoking is a universal custom in the latter country; it is likewise common in India; and Chardin states, that it was also in Persia long before the discovery of America. It must also be observed (as Staunton says), that there is no traditional account of the introduction of the practice into China, or even into India, both countries where foreign usages are not suddenly adopted; and if to the above we add the universality of the custom now, and the peculiarity of their modes of inhaling the smoke, and the forms of their pipes, we cannot wonder that Pallas, and many others, have been led to believe that the custom is aboriginal with them, and that they and other nations of the East were acquainted with its use before the discovery of America. As an example of the prevalence of smoking, which is not confined to any age, sex, or rank, but extends through all classes, to persons of both sexes, and to those even of very early years, Barrow tells us that "every Chinese female, from eight or nine years old, wears, as an appendage to her dress, a small silken purse or pocket to hold tobacco and a pipe, with the use of which many of them are not unacquainted, even at that tender age;" and Staun-

ton confirms this account, for he tells us that "girls, not more than ten years old or younger, coming from the houses near the road out of curiosity to see the strangers pass, were observed to have long pipes constantly in their mouths." The luxury of snuff-taking is also indulged in by the Chinese. A mandarin is seldom without a small ornamented phial (a substitute for our snuff-box) to hold his snuff; of which he occasionally pours a quantity equal to a pinch upon the back of his left hand, between the thumb and index finger, which raising to his nose, he snuffs up the fragrant stimulus with much delight. Powdered tobacco is not the only substance which is used by this people as a snuff. Cinnabar is often employed, either alone or mixed, as opium and odorous substances are for smoking. Tobacco is extensively cultivated, and each person or family not only grow but cure what they require for their own consumption. The climate being dry, and rains not expected during the tobacco-harvest, the mode of preserving is very simple. It is performed generally in the open air, the leaves when plucked being merely hung upon cords to dry; and when sufficiently exsiccated, rolled or packed for use.

Convolvulaceæ, Convolvulidæ.—Argyreia arborea, A. acuta. Erycibe paniculata. Evolvulus. Ipomæa Quamoclit, I. tuberosa, I. chryseides, I. speciosa. Convolvulus Sinensis, C. Batatas, and eleven other species (see page 308). Convolvulus reptans is cultivated in watery places, and its herbage eaten as a substitute for spinach.

Cuscutidæ.—Cuscuta Chinensis.

Hydroleaceæ.—Hydrolea inermis.

Boraginaceæ.—Anchusa tenella, A. officinalis.

Heliotropium Indicum. Cordia (Varronia, *Lour.*) Chinensis.

GENTIANINÆ. *Gentianaceæ.*—Gentiana aquatica. Menyanthes.

Strychnaceæ, Apocynidæ.—Cerbera Chinensis. Nerium Oleander. Echites cordata. Vinca rosea. Wrightia antidysenterica. Strophanthus alternifolius, S. dichotomus. Plumeria alba, P. acuminata, P. obtusa. *Stapelidæ.*—Periploca Chinensis, P. divaricata (cult.) Pergularia odoratissima, P. purpurea. Asclepias curassavica. Calotropis gigantea. Hoya carnosa, H. crassifolia, H. Potsii, H. trinervis. Diplolepis vomitoria, D. apiculata, D. ovata.

Loganiaceæ.—Gaertneria (Hiptage) obtusifolia.

PRIMULINÆ. *Oleaceæ, Jasminidæ.*—Jasminum officinale, J. hirsutum, J. undulatum, J. paniculatum, J. arborescens. Nyctanthes arbor tristis. *Fraxinidæ.*—Fraxinus Chinensis. Syringa Chinensis (?). β Rothomagensis. S. villosa. Ligustrum lucidum. β floribundum. Phillyrea paniculata. Olea (Osmanthus, *Lour.*) fragrans.

The last-named plant is the *lan-hoa* of the Chinese; its leaves and flowers are very fragrant, and they are said to be used by the Hong-merchants to perfume certain kinds of teas, as well as to increase their bulk. A kind of vegetable wax is excreted by Ligustrum lucidum, which is said to be used for economical purposes in China.

Primulaceæ, Myrsinidæ.—Ardisia lentiginosa, A. punctata, A. solanacea. Ægiceras fragrans. (Bæobotrys?) *Primulidæ.*—Primula prænitens, P. Chinensis. Lysimachia (Strigalutea?).

PLANTAGINÆ. *Plantaginaceæ.*—Plantago Lou-

reiri. *Armeriaceæ, Plumbaginidæ.*—Plumbago rosea, P. Zeylanica. Thela coccinea, T. alba.

Plumbago rosea is the blister-root of Rumphius, so called from the acridity of its juices; for if either the root or bark of it, or of P. Zeylanica, be applied to the skin, vesications will be produced like those raised by cantharides.

The marvellous accounts, which some of the older travellers give of the vegetable productions of China, have been purposely excluded from the foregoing details, although it is more than probable that, could we distinguish between the false and true, they would be found to add much to the confined knowledge we at present possess. The authorities consulted have been jealously scrutinized, and their accounts carefully collated. Still some errors may have crept into such an enumeration, and part of these will probably be found to have arisen from the very loose manner in which the Chinese plants have been described, and systematic names applied. Much confusion has been thrown into the inquiry by such carelessness; and the difficulty of unravelling the tangled thread has not been lessened by the severe and prolonged illness under which the contributor has laboured while collecting and arranging the materials condensed into these three chapters.

ZOOLOGY.

CHAPTER IX.

Zoological Productions of the Chinese Empire.

General Observations—Quadrupeds—Cetacea—Birds—Reptiles—Fishes—Shells—Insects.

We may commence our brief sketch of the Chinese Zoology by stating the fact, that of no country on the globe of equal extent do we know so little as to its animal productions, as we do of those which are native to the Celestial Empire. It is long since Malte-Brun observed, that of even the more general, and, according to the usual estimate, the more important features of that vast sovereignty, we owe whatever knowledge we have yet obtained to some ambassadors who have seen the court and the great roads,—to certain merchants who have inhabited a suburb of a frontier-town,—and to several missionaries, who, generally more credulous than discriminating, have contrived to penetrate in various directions into the interior. Now, ambassadors and their attendants, especially in such a country as China, are usually much occupied by their own formalities of state, and being at the same time most jealously watched, have few opportunities of observation, and probably could not, even if so inclined, have derogated so far from their dignity, as to pursue and capture any of those living objects which might have met their view. Merchants, again, are generally engaged exclusively by their professional business, and do not always perceive the advantage of any inquiries which have not a direct tendency to further their "ultimus finis,"—the acquirement of wealth; while missionaries, it cannot be doubted with

loftier and more disinterested ends in view, are for the most part equally disinclined and incompetent to take advantage of their more extended opportunities for acquiring an accurate acquaintance with natural history. Collections of drawings, which are both numerous and important, are perhaps among the best sources of information, and assuredly yield great satisfaction to the private studies of the naturalist; but being, nevertheless, only works of art, they cannot safely, unless supported by some knowledge of the originals, be entered by name and nature into any of the public records of science. We shall therefore here present only a few miscellaneous notices of a subject, the knowledge of which, we hope, the more general intercourse now opening with China, will ere long greatly enlarge.*

Indeed, the zoologist cannot help deeply regretting that, of a country about eight times the size of France (and which, with its other dominions, has been more vaguely calculated to contain five millions of square miles, and thus to equal nearly the tenth part of the habitable globe), the natural history should as yet be almost totally unknown. Our ignorance in this respect implies, in truth, the absence of an element, without which we can scarcely ascertain the great principles of zoological geography, or the laws which regulate the distribution of animal life over the surface of the earth. But as a vast portion of China is believed, on reasonable data, to consist of level, alluvial, cultivated plains,—the scarcity, if not the absence, of most of the larger ferine animals, or beasts of prey, may be safely inferred. The empire, however, is known to be traversed in certain parts by considerable mountain-chains, where various rapacious birds, hitherto undescribed, may hold their undisputed eyries,—

"And beasts that own not man's dominion dwell."

It has been already stated in the opening chapter of the present Work,† that a range of lofty mountains, re-

* The untimely death of Lord Napier, the late chief-commissioner at Canton, an event so deeply deplored by all who appreciated his lordship's public character and private virtues, was also a great loss, viewed as the means of acquiring many valuable additions to our knowledge of the natural features of the country,—it being well known that he was possessed of a strong bias towards scientific observation, and duly impressed with its importance.

† Vol. i. p. 18.

garded as a prolongation of the vast Himmalehs, pervades the western parts of China, and gives an entirely alpine character to the province of Yun-nan. These mountains, spreading eastward, form the northern boundary of Quang-tung, and, continuing in a north-easterly direction, constitute a natural division between Fo-kien and Tche-kiang. Other ramifications spread over various portions of the empire, and near Nan-ngan-fou attain a height of 8000 feet, where they interrupt the vast and otherwise continuous inland navigation between Canton and Pe-king. When we add to the consideration of these great differences of elevation under the same parallel, that of the disparity of climate, arising from the fact, that there is an extent of twenty degrees of latitude between the shores of the Southern Sea and the great Northern Wall, we shall easily conceive what an infinite variety of natural productions, animal as well as vegetable, may coexist under such varied physical conditions.

In relation to ichthyology more especially, we doubt not that a splendid harvest might be reaped, were that branch of science cultivated in China, or laid open to the investigation of Europeans; for we know that one great source of the wealth and fertility of the empire, and consequently of her unbounded population, is mainly derived from the length and magnificence of her rivers, some of which, rising from remote Tartarian springs, traverse in their course the country throughout its entire extent. When we hear also of vast central lakes, like that called Tong-ting, which is nearly 300 miles in circumference, and is not only surrounded, but covered by a numerous population, who subsist almost entirely by fishing, the naturalist sighs to think of the scaly splendour of those unseen forms, the delineation and description of which would so greatly extend the boundaries of his favourite science. It may be generally known, that Baron Cuvier has calculated the amount of *collected* fishes at about *eight thousand;* but how much greater must be their actual number throughout the waters of the whole earth, when we consider what vast portions of that earth are still unknown, with all their wide expanse of glittering lakes, their flowing rivers, and their wave-worn shores! How many even of the strictly pelagic species, too, in spite of the adventurous marine of modern times, still wander unknown through the " dark

unfathomed depths,"—the vast basins of the unbounded ocean! The entomological productions of China, we may be also well assured, are numerous and varied. Indeed, how can it be otherwise in a country of such vast extent, and diversified climate,—where the southern portions enjoy a temperature higher than that of Bengal, while the northern and western districts are exposed to a severer cold than the countries of Europe under the same parallels. The range of the thermometer, indeed, is said to be greater at Pe-king than Madrid, though both capitals lie nearly in the same latitude; and in the former it freezes almost daily in December, January, and February, and not unfrequently in March and November. The cold there is also often followed by intense heat; in other words, winter and summer are the prevailing seasons, without so prolonged an intervention, as with us, of the genial and delightful spring.

Of the *Quadrumanous* order of animals, or that which includes the apes, orangs, &c. we have a slight though singular notice of an example said to occur in a Chinese province. "The province of Fo-kien hath an animal perfectly resembling man, but longer armed, and hairy all over, called *fe-se*, most swift and greedy after human flesh; which, that he may the better take his prey, he *feigneth a laughter*, and suddenly, while the person stands listening, seizeth upon him."* This is, no doubt, an exaggerated picture, drawn from the actual occurrence of some great wood-haunting animal, identical with or allied to the orang-outang, and sufficiently fearful in its native ugliness, without the fancied atrocity of man-eating, or other carnivorous propensities. It is known that the Asiatic orang (*Simia satyrus*, Linn.) occurs in Cochin-China.

As another example of the quadrumanous order, we may mention the *douc* (*Simia nemæus*, Gmel.), commonly called the Cochin-China monkey.† It is a large

* Ogilby's Translation of Nieuhof's China, 2d edit. p. 413.

† *Lasiopyga nemæus*, Illiger. The generic name (from λασιος, *villosus*, and πυγη, *anus*), was bestowed under the impression that there were no posterior callosities in this species; but it has since been ascertained, from specimens transmitted to the Paris Museum by M Diard, and in opposition to the opinion of Buffon, that the usual callosities are obvious, and that the new generic name, like many others, is a misnomer. The genus *Lasiopyga* of Illiger, therefore, cannot be allowed to stand.

species of great rarity, and remarkable for the variety of colours with which it is adorned. Its body is about two feet long, and when standing in an upright position its height is considerably greater. The face is of an orange colour, and flattened in its form. A dark band runs across the front of the forehead, and the sides of the countenance are bounded by long spreading yellowish tufts of hair. The body and upper parts of the fore-arms are brownish-gray; the lower portions of the arms, from the elbow to the wrists, being white. Its hands and thighs are black, and the legs of a bright-red colour; while the tail, and a large triangular spot above it, are pure white. From this general description, it may easily be supposed that this creature presents a very strange and grotesque appearance.

A still more remarkable species in some respects is the *kakan* or proboscis-monkey (*S. nasalis*, Gmel.).* This animal stands about three feet in height. The general colour of its fur is of a reddish brown; the face black, with a nose of such extraordinary length as to exhibit the most singular profile imaginable. Its whole appearance reminds the spectator of some ludicrous caricature, in which a painter endeavours to combine the characters of man and beast. It is a rare species, though said to be spread over a wide extent of territory, and occurring likewise in the great island of Borneo. It is sometimes seen in vast flocks, and is alleged to be of a ferocious disposition; but this is most likely a calumny, like that which attributes anthropophagous propensities to the laughter-loving *fe-se*. It is usually seen on trees bordering the banks of rivers, and exhibits great activity, bounding from branch to branch, and shooting rapidly through the air for a space of fifteen or twenty feet. The name of kakan is supposed in some measure to express the long-continued cries uttered by these animals when assembled in troops during the evening and morning twilight, the periods during which we are informed they most delight to hold their orgies. When some Cochin-Chinese on one occasion visited the Paris Museum, they at once recognised the stuffed specimen of this animal as belonging to a species with which they had been elsewhere acquainted. The native denomination is *khi-doc*, which sig-

* It forms the genus *Nasalis* of Geoffroy.—Ann. Mus. xix. 21.

nifies great monkey. Messrs Vigors and Horsfield have described an allied species (if it be not the same), in which the nose is scarcely one-third of the length, and recurved. They suspect it may turn out to be the young of the proboscis-monkey.*

The name of Chinese bonnet-monkey, bestowed upon another species (*S. sinica*, Gmel.), might induce the English reader to mistake its natural locality. It is, however, a native of Ceylon, and has received its name from the unusual disposition of the hair on the top of the head, which spreads out in a circular direction, presenting a fancied resemblance to a Chinese cap. "We have not been able," says Du Halde, "to gain an exact knowledge of some extraordinary animals which are said to be found in the mountains; and what they relate of some in particular is so extravagant, that it is unworthy of the attention of the public. That which they constantly affirm of the animal *sin-sin* makes one think it is a kind of ape. They say that it is the size of a man, and resembles mankind in almost all its actions."† In the island of Hai-nan there is a large black ape of good features, but scarce. In the same locality there is also a gray kind, very ugly and common.‡ In the province of Quang-see there is a yellow one, the form and voice of which resemble those of a dog.

We possess no detailed or specific knowledge of the cheiropterous tribe, or bats of China. In the province of Shen-see there is a kind equal in size to a hen, which, considered as an article of food, is esteemed by the natives as highly as the most delicious bird.

Frequent mention is made of bears, especially in the northern provinces, and the feet or paws of these animals are regarded as an excellent and nutritious dish. The extensive commercial intercourse between the Chinese and Russians in peltry is well known; and hence we need scarcely remark, that no accurate information regarding any of the fur-bearing animals of the country can be gleaned from the casual observance of the robes, or other dresses of the people, the materials of most of these being conveyed from northern climes. Among the

* Zoological Journal, No. XIII. p. 110.

† Du Halde, vol. i. p. 20. ‡ Ibid. p. 249.

species indigenous to China, mention however is made of a great number of "yellow rats," much larger than those of Europe, the skins of which are greatly prized.

Our knowledge of the feline animals of that country is still extremely vague. It is probable that the number of the larger and more ferocious kinds, in consequence of the extension of agriculture and population, has decreased throughout the provinces during the later centuries, but during the earlier times of the Tartar dynasty they seem to have abounded in the northern districts. In the days of Marco Polo, the multitude of tigers in some parts of the empire rendered travelling alone extremely dangerous; and Martini, speaking of Tche-kiang, observes, "On trouve dans ci pays des tigres puisque par tout, qui Marco Polo de Venise appelle impropremen' des lions." Tigers and other species seem indeed to have been well known even in a domestic state. "The Grand Khan," says the old Venetian writer, "has many leopards and lynxes kept for the purpose of chasing deer, and also many lions, which are larger than the Babylonian lions, have good skins, and of a handsome colour, being *streaked lengthways with white, black, and red stripes.* They are active in seizing boars, wild-oxen, and asses, bears, stags, roebucks, and other beasts that are the objects of sport. It is an admirable sight, when the lion is let loose in pursuit of the animal, to observe the savage eagerness and speed with which he overtakes it. His majesty has them conveyed for this purpose in cages placed upon cars, and along with them is confined a little dog, with which they become familiarized. The reason for thus shutting them up is, that they would otherwise be so keen and furious at the sight of the game that it would otherwise be impossible to keep them under the necessary restraint. It is proper that they should be led in a direction opposite to the wind, in order that they may not be scented by the game, which would immediately run off, and afford no chance of sport."*

* Marsden's Travels of Marco Polo, p. 338. It is obvious from the descriptive expression, which we have marked in italics, that the animal referred to was not the lion, though some may also doubt its identity with the powerful species commonly called the Bengal tiger. That quadruped, however, is known to have a widely-extended distribution in a northern direction.

Although the preceding description scarcely coincides with any well-established practice in the modern field-sports of the East, where, in these degenerate days, a much smaller species, called the *chittah* or hunting-leopard (*Felis jubata*), is the kind in use; yet we know that the power and perseverance of man, when judiciously applied, are capable of subduing the most ferocious of the feline race, and we are therefore in no way entitled to reject a particular statement merely because it does not accord with our own experience. Neither can any argument be adduced against it in connexion with geographical distribution; for, although the tiger is rare in North-western Asia, and seems seldom to pass to the westward of a line drawn from the mouths of the Indus northwards to the shores of the Caspian Sea, yet its domain is much more extended from south to north than that of the lion. It not only advances far into those desert countries which separate China from Siberia, but also occurs between the Irtysch and the Ischim, and even, though rarely, as far as the banks of the Oby.*

"As for animals," says Du Halde, "besides those that I have spoken of already, there is in China a great number of wild beasts of all sorts,—such as wild-boars, tigers, buffaloes, bears, camels, rhinoceroses, &c., but there are no lions."†

Sir George Staunton regarded the lion as a creature of the imagination among the Chinese, or at least he supposed that their statues of that noble animal were merely bad imitations of indifferent drawings. It is certainly not native to the country, but it is equally certain that it has occasionally been seen there from very remote times. Although Marco Polo seems to confound the king of beasts either with the tiger or some species of hunting-leopard, yet in his account of the festival of the White Feast, he probably indicates the true species when he says, that at one period of the cêremony a lion is conducted into the presence of his majesty, "so tame, that it is taught to lay itself down at his feet." Now, this would not have been so worthy of remark, had it related to the animal ordinarily used in hunting, and which, being so used, must have been already reduced almost to the domestic state. Frequent

* Edinburgh Cabinet Library, No. VIII. Historical and Descriptive Account of British India, vol. iii. p. 30.

† Vol. ii. p. 267.

mention is elsewhere made of lions which had been sent to China as presents from Western potentates. Du Halde alludes to one as among the gifts presented to Hong-vou, the first of the Ming emperors, and adds, in ignorance of the authority just quoted, "c'est la première fois que les Chinois virent un animal de cette espèce."* This was during the fourteenth century, and in the year 1421 Shah Rokh's ambassadors carried with them another, which was presented to Yong-lo. Considerably later in the fifteenth century, two were sent in name of tribute to Hien-tsong by the King of Samarcand. Of each of these the nourishment consisted "de deux moutons par jour, et de deux grands vases d'une liqueur faite avec du lait et du vinaigre."† These authorities suffice to disprove the assertion of a modern traveller, that the lion has never been brought amongst the Chinese, either as a present to the sovereign, or as an object of curiosity or profit.

Several species of lynx and leopard also occur in the empire. In regard to the smaller domesticated feline animals, the ladies of Pe-king and of other parts of the provinces of Pe-che-lee are known to be extremely fond of a particular variety of domestic cat, provided with long hair and hanging ears, probably allied to that variety which we call Angora cat. They keep this sort very tenderly, but they not unfrequently *eat* the others.

The Chinese, indeed, may be regarded as among the most omnivorous of nations; and in the article of animal food there is scarcely any thing which they are seen to refuse. The flesh of wild-horses is in great esteem, while (not to speak of birds' nests, which are formed of sea-weed‡) bears' paws, and the feet of "divers wild

* Tome i. p. 506.

† Mémoires sur les Chinois, tome xiv. p. 37.

‡ "The weed which composes this branch of commerce is the *sphærococcus cartilagineus*, var. *setaceus aq.*, which is found in great abundance in this part of India. It is eaten by the bird (*Hirundo esculenta*) which builds the nests in question, and is used in the preparation of its precious nest. The swallow eats the fresh weeds, and permits them to soften for some time in its stomach, after which it throws up the mass, now converted into a jelly, and sticks it together to form the nest. The nests, which are subsequently smeared over with dirt and feathers, are brought in their raw state to China, where they are cleaned in immense warehouses built for the purpose, and then exposed for sale. These so celebrated Indian nests are, therefore, hardly any thing more than

beasts," are brought ready salted from Siam, Cambodia, and Tartary, and are accounted great delicacies even by persons of distinction. The common people are very fond of horse's and dog's flesh, even when these animals have died of age or sickness; and they make no difficulty in eating cats, mice, rats, and similar creatures, all of which are regularly sold in the streets. Du Halde observes, that it is "a very good diversion to see the butchers, when they are carrying dog's flesh to any place, or when they are leading five or six dogs to the slaughter-house; for all the dogs in the street, drawn together by the cries of those going to be killed, or the smell of those already dead, fall upon the butchers, who are obliged to go always armed with a long staff or great whip to defend themselves from their attack, as also to keep their doors close shut that they may exercise their trade in safety."*

The Chinese, according to Meyen, eat almost every thing that comes to hand. "Upon the streets of the city, but particularly on the large square before the factories, a number of birds are daily exposed for sale, which amongst us have not yet gained much repute for flavour; among others, hawks, owls, eagles, and storks. To a European, nothing can have a more laughable effect than to see the Chinese arrive with a carrying-pole, supporting two bird-cages, which contain dogs and cats instead of birds! A small thin sort of spaniel appeared to us to be most in request; they sit quite downcast in their temporary dwellings when they are brought to market, whilst the cats make a dreadful squalling, as if conscious of their fate. The flesh of these last, when they are well fed, is much esteemed in China, and they are often seen on the tables of the rich. Other Chinese bring upon their carrying-pole many dozens of rats, which are drawn quite clean, and like pigs in our country, when they have been

the softened *sphærococcus cartilagineus* which we have brought with us from the Chinese seas, and their effect is no other than that of fine jelly. In the preparation of these nests, such a number of fine stimulants are generally added, that they of right occupy the first rank amongst relishes at the tables of the Chinese. The Japanese had long ago discovered that these costly bird-nests are nothing more than softened seaweed, and now prepare the substance itself in an artist-like manner."—Meyen's "Voyage Round the World," as quoted in Quarterly Review, vol. liii. p. 333.

* Vol. ii. p. 237.

Chinese Fox.

opened, are hung up by means of a cross piece of wood through the hind-legs. These rows of rats look very nice, but they are only eaten by the poor."*

We here represent one of the carnivorous animals, native to the country. It is the racoon-faced dog, or Chinese fox, the *Canis procyonoides* of Mr Gray.†

Of the more peaceful tribes, a species of porcupine is a well-ascertained inhabitant of many parts of China, and various animals interesting to the sportsman are found in abundance. The island of Hai-nan produces a great variety of game, and there is consequently good shooting in it; while the northern capital of Pe-king is known to be still more abundantly supplied with the same commodity. In the depth of winter many kinds of animals are seen lying there in heaps hardened by the frost, and consequently free from all corruption. "There are prodigious numbers," says Du Halde, "of bucks, does, wild-boars, goats, elks,‡ hares, rabbits, squirrels, cats, field-rats, geese, ducks, woodcocks, pheasants, quails, and several other creatures that are not to be met with in Europe, and are sold exceeding cheap."§

The figure represented on page 401 exhibits an accurate likeness of the Chinese bamboo-rat, *Rhyzomys Chinensis* of Mr Gray.‖

In the plains, or rather valleys, beyond the Great Wall, into which Lord Macartney made his way while proceeding to visit the emperor's summer-residence, a species of hare was very abundant. We do not know how nearly it may approach to the alpine species of the Scottish mountains, or to those found so generally in the northern regions of Europe and America, but it resembled them in this respect, that it changed its colour during winter from brown to white. It was likewise remarkable for the great length of its feet, or toes, which form a broad basis of support when the animal scampers over the surface of the snow.

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* Voyage round the World, as quoted in Quarterly Review, vol. liii. p. 337.

† Illustrations of Indian Zoology.

‡ Probably not the true *Cervus alces*, but some other large-sized species of deer.

§ Du Halde, vol. ii. p. 238.

‖ Proceedings of the Committee of Science of the Zoological Society.

In those parts of the empire, hares, though objects of sport, are seldom hunted by dogs, but are more generally driven into snares by crowds of people assembled at first in a wide circumference, and gradually closing in towards the centre, with loud shoutings and a general beating of shrubs and bushes, to the fearful discomfiture of the timid creatures.

The mighty elephant, "wisest of beasts," though by no means generally distributed, nor ordinarily used as in India as a beast of burden, is well known in China as an appendage of imperial greatness. It is, of course, highly esteemed on account of its surpassing qualities, both of docility and strength. no less than for its singular form and enormous size. The elephants of that country, though they must have been originally brought from the vicinity of the equator, are smaller than those of Cochin-China, and of a lighter hue. A few are said to have bred to the northward of the tropic. They appear to have been very anciently known, even in remote parts of the empire, although their reputed numbers, it may be presumed, have been much exaggerated. "On this day," says Marco Polo, in describing the commemoration by the Grand Khan of the festival of the White Feast, "it is that all his elephants, amounting to five thousand, are exhibited in procession, covered with housings of cloth, fancifully and richly worked with gold and silk, in figures of birds and beasts. Each of these supports upon its shoulders two coffers, filled with vessels of plate and other apparatus for the use of the court. Then follows a train of camels, in like manner laden with various necessary articles of furniture. When the whole are properly arranged, they pass in review before his majesty, and form a pleasing spectacle."*

As Kublai, one of the conquering heroes of the thirteenth century, and khan at the period referred to in the preceding extract, had subdued Ava and other southern provinces, where elephants are known to have abounded, and where they were opposed to his armies in battle, it is probable that he then added these gigantic and imposing animals to his establishment, if not for military purposes, at all events for parade, and as beasts of burden. We accordingly find, that they continued to be delivered

* Marsden's Travels of Marco Polo, p. 329.

Bamboo-rat.

to him in tribute by conquered princes,* and a few are still kept by the emperors of the reigning dynasty. "After dinner," says Bell, "we were conducted to the emperor's stables, where the elephants are kept. The keeper asked the ambassador to walk into his apartments till they were equipped; then we went into the court and saw these huge animals richly caparisoned in gold and silver stuffs. Each had a rider on his back, who held in their hands small battle-axes, with a sharp pike at one end, to drive and guide them. We stood about an hour admiring these sagacious animals, some of them very large, who, passing before us at equal distances, returned again behind the stables; and so on round and round till there seemed to be no end of the procession. The plot, however, was at last discovered by the features and dress of the riders; and the chief keeper told us there were only sixty of them. The climate of Pe-king is too cold for them to breed; and all these were brought from warmer countries. The emperor keeps them only for show, and makes no use of them, at least in these northern parts."†—"Nous rencontrâmes," says Van Braam, "six grands éléphants qui entraient dans Pé-king, ayant presque tous des dents longues, mais minces. C'est un present envoyé à sa majesté par un grand mandarin, residant aux frontiers de l'ouest."‡

China is famous for its pigs, and throughout most of the provinces pork is much more abundant than mutton. The love of the latter viand has even been assigned, by a philosophical historian, as a principal reason for the rejection by the whole nation of the laws and the religion of Mohammed! We do not know in what condition they exist throughout the empire; but the British races have been greatly ameliorated by a cross, supposed to be of Asiatic origin. These never attain to the size of the Berkshire breed. In colour they vary; some being black, some white, others irregularly patched with black and white. They are frequently of a dark-gray, occasionally of a sandy hue. It is said that a similar breed is widely diffused over New Guinea and the islands of the South Sea;§ and the Chinese hog is believed

* Marsden, *loc. cit.* p. 333. † Vol. ii. p. 25.
‡ Voyage en Chine, tome i. p. 280.
§ Quarterly Journal of Agriculture, vol. iii. p. 41.

likewise to occur in Java and the other great Eastern Islands.* Although the form of this variety is undoubtedly good, and its flesh very excellent (we allude to it as now existing with ourselves), people of delicate taste are apt to think that it fattens somewhat too easily. It has, however, proved a very valuable medium for improving this useful animal in Great Britain; for, by a mixture of the Chinese black with those of our own larger breeds, a kind has been produced possessing qualities superior to those of either of the parent stock. They are extremely prolific, are sooner fattened than the larger kinds upon a more slender supply of provisions, and they cut up when killed into more useful and convenient portions.† The individual engraved by Bewick belonged to Mr Moubray of Sherburn, in the county of Durham. She had a litter of nineteen pigs to support at the time, and that was her third within ten months; her produce in that short period amounting to no fewer than fifty. The black Chinese breed is now of common occurrence in all parts of this country. Their dimensions are smaller, their legs shorter, and their flesh whiter and sweeter than those of the ordinary kind.‡ The finest of them are remarkable for the delicacy of their appearance, for their thin transparent ears, their small heads, and short but slender legs. They are perhaps somewhat too small for bacon, but for roasting-pigs, and the production of the most delicate pork, they stand unrivalled.

The race known abroad under the title of *Cochon de Siam*, seems, in a great measure, to correspond with our Chinese breed. Their ears are short, straight, and flexible; the body is covered by soft and somewhat silky hair, stiff and thickish on the head and back of the neck, but frizzly on the cheeks and under-jaw,—on the other parts thin, and for the most part hard and black. The skin is also black, except on the abdomen; the eyes are surrounded by a slight tinge of flame-colour; their tails measure nine inches in length; their bodies three feet three inches; their height at the shoulder is one foot ten inches. This breed appears to have spread extensively over a great proportion of the southern shores of the Old Continent.‖ We may here add, that the pigs

* Hawkesworth's Voyages, vol. iv. p. 204.
† Bewick's Quadrupeds, p. 164.
‡ Quarterly Journal of Agriculture, vol. iii. p. 42. ‖ Ibid.

of the Cape of Good Hope make a near approach to the Siamese breed, though they are somewhat smaller, and that the smooth or short-legged swine of Spain, Portugal, Savoy, and Italy, are derived from those of China. To a local variety of the same the world is indebted for Bologna sausages. In conclusion, a celebrated species in France, known under the name of *Porc de Nobles*, is derived from an improved English description, which had its origin from a cross between an Anglo-Chinese sow and an emancipated American boar.

Some naturalists are of opinion, that there exists both in the Indian and Chinese dominions a species of wild-boar distinct from the one known in Europe, and that it is the more probable source from which the Siamese domestic breed and that of China have been derived.* We know that the wild-boar, of whatever kind, is often met with in the country in question.

Occasional mention is made by Du Halde and others of the rhinoceros as an inhabitant of the Celestial Empire; but we are not aware that its existence there has been recognised or admitted by modern naturalists.

The camels best known there belong to what is called the Bactrian, or two-humped kind (*Camelus Bactrianus*, Linn.). Du Halde describes them as shorter in the legs than the common camel (or Arabian species, usually called the dromedary), with a shorter and thicker neck, "covered with thick hair as long as that of goats: some of them are of a yellowish-dun colour, others are a little upon the red, and of an ash-colour in some places; the legs are not slender as those of the common camels, insomuch that this sort seems for its largeness more fit to carry burdens."† It is asserted that it will carry from 1000 to 1200 weight. The camel has been frequently used in war, and the Chinese are known to have employed it in 1755-9 against the Eluths. Their military mandarin and commander-in-chief, A-koui, carried swivels on its back.‡ The swiftest of their breed is named *tong-kyo-fo*, or camel with feet of the wind. Though now un-

* Dictionnaire Classique d'Hist. Nat. tome iv. p. 271.

† Du Halde, vol. ii. p. 268.

‡ Griffith's Translation of the "Animal Kingdom," vol. iv. p. 43.

known in the wild state,* the camel is believed to be a native inhabitant of Central Asia. In a domestic condition it is widely spread throughout the great Tartarian wastes, and extends across the Desert of Cobi, almost as far as Lake Baikal; but in a southern direction its distribution is more restricted than that of the single-humped species (*C. dromedarius*, Linn.).

One of the most remarkable of the Chinese animals is a hornless species of deer (commonly so called), from which is obtained the familiar perfume known under the name of *musk*. The musk-deer (*Moschus moschiferus*, Linn.) roams over a vast extent of Alpine territory, from Thibet to the vicinity of Lake Baikal, and occurs in many of the mountainous parts of the empire. It is very much sought after, on account of the odorous and penetrating substance which it produces from a glandular pouch beneath the tail; and the flesh is also esteemed by many, notwithstanding its being strongly impregnated by the musky ingredient. It is chiefly hunted during the rutting-season, because the musk is then secreted in the greatest abundance, and is of the highest quality. This creature is uncommonly wild and timid, of extreme swiftness, and capable of making its way with the greatest celerity among the most rugged mountains. It is described as gregarious by many European compilers; but the few original notices which we have been able to collect, rather describe it as solitary, or living in single pairs.

There are three modes of obtaining the musk-deer, or *che-kiang*, as it is called in the East. The first consists simply in shooting it, which, however, is by no means easily effected. The sportsman must climb among the mountain-fastnesses like a chamois-hunter, and ascend towards the most inaccessible places. He must, at the same time, not only keep himself concealed, but maintain the most guarded silence, for their hearing is extremely acute. It is even said that advantage is taken of the refinement of this sense to lure the shy fugitives to their destruction. One of the hunters begins to play some lively airs upon the flute, and the *che-kiang*, unaccustomed to such

* "Pallas rapporte, sur la foi des Bouchares et des Tartares, qu'il y a des chameaux sauvages dans les déserts du milieu de l'Asie; mais il faut remarquer que les Calmouques, par principe de religion, donnent la liberté à toutes sortes d'animaux."—Regne Animal, tome i. p. 257.

melodious changes amid its barren and unpeopled crags, listens as it were enrapt, and frequently approaches, so near the place of ambuscade as to receive its mortal wound. This, says our present authority, may be regarded as a fable in Europe; "mais nous croyons devoir dire que nous sommes pas contentés du témoignage. des livres, et que nous avons pris la précaution de constater le fait et de le vérifier par des dépositions de témoins oculaires."* The second method consists in placing nets and gins in spots where they are wont to pass; but either their excessive wariness, or some other cause, renders it with rare exceptions ineffectual. The last method is the most singular as well as the most troublesome. They encumber the sides of some deep and lonesome defile with a kind of palisade of thick and prickly bushes, and afterwards assembling in the more open and distant quarters, they advance forwards through the closing defile, uttering loud cries, with the chance of driving the *cho-kiang* towards the palisade. If successful in this measure, other hunters who have lain concealed are ready with strong nets placed over the narrow opening, by which the prey is speedily secured. The snares are made of a species of wild hemp, green and unbroken, that the artifice may the more surely escape the eye of the destined victim.

This species of deer in size and general aspect is not unlike a roe, though the upper lip is broader, owing to the projection of the canine teeth. The hair is coarse, of a brittle texture, and grayish-brown colour. It was unknown to ancient (classical) authors, and according to Dr Shaw was first described by Serapion, an Arabian writer of the eighth century. We understand that the musk of Thibet is more valued than that of China.†

* Mémoires sur les Chinois, par les Missionaires de Pé-king, tome iv. p. 496.

† We need scarcely guard the reader against the extraordinary misconceptions to be met with in some authors regarding the natural food of the musk-deer, which, of course, is herbivorous like all its order. A not uncommon belief, however, prevails, that it feeds on the flesh of serpents, which it is said to kill with ease, however great their size, by overpowering them, even from a distance, by the strength of its pervading odour. "This is so certain," says Du Halde, "that when the peasants go to cut wood, or make charcoal in the mountains, they have no better secret to guard themselves against serpents, whose bite is exceeding dangerous, than to carry about them a few grains of musk. Then they sleep quietly after they have dined; and if any serpent comes near them,

Of the horned, or rather antlered ruminants, such as deer properly so called, there seem to be several kinds throughout the bounds of the Celestial Empire; and one small species, described as being no larger than an ordinary-sized dog, is often kept by the nobility for amusement in their pleasure-grounds and gardens.

From the swift and beautiful tribe of antelopes, we shall here only select the *Dzeren* (*A. gutturosa*), commonly called the Chinese antelope. Its body is somewhat heavy; its horns short and thick, about nine inches long, annulated to the very tips, reclining backwards, divergent, wavy, with the points turned inwards. The nose is blunt, the lips beset with longish hairs, the ears small and pointed; but one of the chief characteristics of this animal, according to Colonel Hamilton Smith, is a large moveable protuberance in the throat, occasioned by the dilatation of the larynx, and appearing externally clothed with long stiff hairs pointing forwards. In the old males it looks monstrous, from its great enlargement. Beneath the abdomen of the male there is a glandulous bag, resembling that of the musk, but devoid of odoriferous exhalation. The dzeren is known in China by the name of *hoang-yang*, or the yellow goat. It occurs also in the deserts between that empire and Thibet, extending into Eastern Siberia, and even over the great sandy Desert of Cobi. It is said to avoid woody places, and to give the preference to open plains and barren mountains. It is an animal of great swiftness, and long endurance of fatigue; and is, moreover, noted for the surprising bounds which it makes in running. Of a gregarious disposition, it as-

it is stupified all of a sudden by the smell of the musk, and is able to get no farther." Here follows the proof:—"That which happened when I was on my return from Pe-king, was in some sense a confirmation that the flesh of serpents is the principal food of the musk-animal. They served up for supper part of the roebuck (so the musk-deer is also called), and one of those who was at table had an exceeding aversion for serpents, and this to so great a degree, that the mentioning the word before him would make him extremely sick; he knew nothing of what was reported of this animal and the serpent, and I was very careful to say nothing at all about it, but I watched his countenance very carefully. He took some of the roebuck, as others did, with a design to eat it, but he had no sooner put a bit in his mouth, but he found his stomach rise prodigiously, and refused to meddle with any more."—Du Halde, vol. ii. p. 269. We presume there may be people in this world who dislike both musk and serpents.

sembles in vast troops towards the autumn season, and in winter it not unfrequently approaches the vicinity of human dwellings.* The species called the *Saiga* (*A. colus*), the horns of which form an article of trade with the Chinese, who manufacture them into lanterns, is not an actual native of their country.

The goat also is domesticated, though sheep, as already noticed, are rather scarce, and in some of the provinces are hardly known. We possess no detailed information regarding the nature of the breed, if we except that supplied by Colonel Hamilton Smith, who is of opinion that the *Hottentot broad-tailed sheep*,—a variety characteristic of Southern Africa, and now introduced to Madras and Bengal,—has also made its way, under certain modifications, into the Chinese empire. So also the *fat-rumped sheep*, described by Pallas as characteristic of the steppes of Russia, is known to have spread to Persia on the one hand, and to China on the other. With regard to wild-sheep, we have no intelligence on which we can rely, more especially as regards the occurrence of the *argali*. It inhabits the mountains of Central Asia, and the elevated steppes of Siberia, from the banks of the Irtysch to Kamtschatka; and therefore its existence in some of the northern wilds of the Chinese dominions is by no means an improbable supposition.

In reading the more ancient descriptions of that great kingdom, we find frequent allusion made to wild-oxen. Marco Polo compared them in size to elephants, and said that when domesticated they produced a breed with the common kind, of a very noble nature, and better qualified to undergo fatigue than any other. In the province of Yun-nan, according to Du Halde, there is a "kind of cows, of whose tails divers uses are made; in particular, stuffs through which rain cannot penetrate, and carpeting, which is very valuable, and with which Chinese officers adorn their standards and bucklers."† Both authors refer to the animal now known as the *yak*, or grunting-ox (*Bos grunniens*, Pallas),—the *soora goy* of the Hindoos. It inhabits the central mountains of Asia, and appears to have spread into China from Thibet; where it is tamed by the Mongolians and other Tartar tribes. Though by no means large boned, this quadruped looks very bulky, owing to the vast quantity of

* Griffith's Animal Kingdom, vol. iv. p. 230.

† Vol. i. p. 263.

long hair with which it is covered. It has a downcast, heavy look, is sullen and suspicious, and usually exhibits considerable impatience on the near approach of strangers. The yak is sure and strong footed as a beast of burden, and capable of carrying great weights; but we do not understand that it is employed in agriculture. The *horse-tails*, as they are commonly called, used as standards by the Turks and Persians, are made from the long hairs found on the tail of this species. The Chinese also dye them of a beautiful red, and wear them as tufts to their summer bonnets.*

Another bovine animal, often mentioned, though still but obscurely known, is the *arnee*, under which name it is probable that two distinct species have been confounded. It is rather a buffalo than a bull, and in the wild state inhabits the woody valleys at the southern bases of the Himmaleh Mountains, and those of the Birman Empire. It is the supposed origin of a domesticated race, generally diffused over China, the Malayan Peninsula, and the Indian Archipelago. When full grown, the male is said to be near seven feet high at the shoulders, three feet broad at the breast, and the horns from five and a half to six and a half feet long. The true arnee has a white skin, entirely covered with longish black hair, and a short tail.† The other, and more common one, is also a very large animal, and though nearly a foot lower in stature than the gigantic species just alluded to, it is scarcely less in weight. The head is smaller, the body longer, the tail reaching nearly to the heels, the hide black or dark-coloured, and but scantily covered with hair. In its habits it is gregarious and almost amphibious,—at least it is extremely fond of woody swamps and marshes. It is said to plunge under water, to raise aquatic plants with its horns, and to feed on them while floating lazily downwards with the stream.‡ Colonel Hamilton Smith informs us, that the greater wild-buffalo of the central districts of Bengal is usually named arnee or arnaa, and is distinguished by its black colour and the lunate form of the horns; while the lesser sort, generally but not exclusively known in the domestic state, is named *bhain* or

* Turner's Account of an Embassy to Thibet. In this work the yak is figured under the name of the *bushy-tailed bull*. See plate x. p. 186. † Synopsis of Mammalia, p. 372.

‡ Griffith's Animal Kingdom, vol. iv. p. 391.

bine, and has much shorter horns, bent back towards the neck, with the points turned upwards. "But neither of these is the gigantic or Taŭr-elephant arnee, which appears to be a rare species, only found single, or in small families, in the upper eastern provinces and forests at the foot of Himmaleh, though formerly met in the Ramghur districts."* Now the bhain is generally regarded as the origin of the domestic buffalo (*Bos bubalus*, Linn.), an animal well known all over the East, and introduced into Italy (it is the *buffus* of the Middle Ages) about the close of the sixth century, and at present grazing in numerous herds among the Pontian Marshes. But to which of these animals the Chinese buffalo strictly belongs, is a point which, in the present state of our knowledge, we presume not to determine. Baron Cuvier does not even admit that the buffalo and either of the arnees are distinct from each other.†

The domestic cattle belong for the most part to the humped or zebu kind, called *deswali* in India. They correspond in size to the smaller British races; the hump is by no means large; the forehead rounded; the horns short, bent backwards; the dewlap loose; the prevailing colour white. We shall not here enter into the complex question which regards the origin of these and other breeds of cattle; holding it enough merely to mention the opinion entertained by some authors, that the humped oxen of the East are descended not only from the mysterious and now unknown *urus* of the ancients, but also from an intermixture with the *Gayal* (*Bos gavæus*, Smith), an inhabitant of the mountain-forests to the east of the Brahmapoutra, Silhet, and Chittagong. In shape and size it resembles an English bull; and, although its aspect is stupid and heavy, it almost equals the wild buffalo in activity and strength. It is domesticated in India, where it is held in the highest veneration by the Hindoos; and is still more extensively reared by a people called *Kookies*, who inhabit the eastern boundaries of the province of Chittagong.‡ Its occurrence in the wild state renders

* Ibid. p. 389.

† "Il y en a (he is referring to *Bos bubalus*, Linn.) aux Indes une race dont les cornes ont jusqu'à dix pieds d'envergure; on l'appelle *arni* dans l'Indostan. C'est la *Bos arni* de Shaw."—Règne Animal, tome i. p. 280.

‡ It is the *Bos frontalis* of Lambert.—Linn. Trans. vol. viii. pp. 57-302.

Baron Cuvier's opinion inadmissible, that it may be a race "qui provient peut-être du mélange du buffle avec l'espèce commune."*

In some parts of the province of Shan-tung, the Chinese cows are said to breed within them a peculiar yellow-coloured stone, which the natives call *nieou-hoang*. It is sometimes as big as the egg of a goose, though no harder than plumbago, and is more highly esteemed by the native physicians than even the bezoar-stone. They allege that, when it is "pulverized in hot water," it cures defluxions and catarrhs, "*in the same manner* as the stone which grows in a bullock's gall-bladder cures the jaundice."† This is very likely.

We shall now bring our notices of the Chinese mammiferous animals to a close, by a brief indication of certain cetaceous tribes. It may suffice merely to name the dugong or douyong of the Malays (*Halicore dugong* of naturalists),—the "daughter of the sea," which we are inclined to believe occurs occasionally along the shores of China, though hitherto captured only off the coasts of Sumatra, and the vicinity of Sincapore. This animal is the mermaid of the East.

A few porpoises were observed, during the progress of Lord Amherst's embassy, in the Yang-tse-kiang, and were called river-pigs by the Chinese.‡ Another species is described by Osbeck as an inhabitant of the neighbouring seas.§ It resembles our common porpoise (*Delphinus phocæna*), and bears the systematic name of *D. Sinensis*. A third species briefly described by Lacépède‖ as of a uniform black colour, with the commissure of the lips and the edge of the pectoral and dorsal fins white, has been seen along the coasts of China and Japan. It is named *Delphinus niger*.

A species of the whale tribe, called the furrowed cachalot (*Physeter sulcatus*, Lacép.), of which we know nothing more than a Chinese drawing communicated by M. Abel Remusat can convey, occurs in the seas of Japan, and no doubt in other parts of the Southern Ocean.

Various species of whales, properly so called (*Balænæ*), have been briefly described by Lacépède, from Chinese

* Règne Animal, tome i. p. 200. † Du Halde, vol. i. p. 222.
‡ Abel's Journey, p. 171. § Voyage à la Chine, tome i. p. 7.
‖ Mem. du Mus. tome iii.

drawings. Of their history and attributes we are entirely ignorant; and their technical descriptions, considering the source from which these have been derived, would neither interest nor instruct the reader. Their names are, *B. Japonica, lunulata, punctata, nigra, macalata,* and *cæruleascens.**

We shall next notice a few of the feathered tribes of China.

The ancient rulers of that empire, especially those of the Mongol dynasties, were famous for their love of the noble amusement of falconry, and Kublai (who held the supreme power during the sojourn of Marco Polo) was said to employ no less than 20,000 attendants in his hawking-excursions. Every bird belonging to his majesty, or his nobles, had a small silver label attached to its leg, with the names of its owner and keeper engraved upon it. Thus, a hawk, to whatever distance it had flown, was immediately recognised, and restored to the person to whom it belonged. What were the exact species employed we cannot clearly tell, although the terms jerfalcon, sacre, lanner, peregrine, and others, are freely bestowed by various writers, without perhaps any very precise or appropriate application. Within the district of the city of Han-tchong-fou there is a bird of prey of the falcon kind called *hai-tsing,* much esteemed for its courage and quickness. When caught, it is immediately carried to the emperor's falconer.

The Great Khan (of Marco Polo's days) had also eagles which were trained to stoop at wolves; and such was their size and strength, that none, however large, could escape their talons. So at least reports the old Venetian traveller. At the city of Changanor (Chahan-nor of the modern maps) there was a palace frequently visited by the emperor, "because it is surrounded with pieces of water and streams, the resort of many swans, and with plains, where are found in great numbers, cranes, pheasants, partridges, and other birds,"† and the greatest amusement was derived from sporting with jerfalcons and hawks in consequence of the vast abundance of the game. Five species of cranes are enumerated and briefly described, one of which seems to accord with the *Grus leucogeranus.* When this

* See Mém. du Mus. d'Hist. Nat. tome iv. p. 470.

† Marsden's Travels of Marco Polo, p. 248.

great sportsman travelled (being afflicted with the gout), he was conveyed in a magnificent pavilion, lined with cloth of gold, covered externally by the skins of tigers, and supported by four gigantic elephants. In this pavilion he always carried with him twelve of his best jerfalcons, with twelve officers, selected from his favourites, to keep him company and minister to his amusement. His attendants on horseback gave notice of the approach of cranes or other birds; upon which, raising the curtain of his pavilion, he espied the game, and gave directions for the falcon's flight. "The view of this sport, as he lies upon his couch, affords extreme satisfaction to his majesty, as well as to the officers who attend him, and to the horsemen by whom he is surrounded."*

Among the nocturnal birds of prey, or owls, we find several species native to the imperial dominions. We have seen a Chinese drawing of the common barn-owl of Britain (*Strix flammea*), from which we presume that that ghost-like species, which so often haunts our "ivy-mantled towers," is likewise an inhabitant of the Celestial Empire. We know that it occurs in New Holland, and in almost every other quarter of the globe.

Of the great and diversified *passerine* order of birds, we find of course in China, as elsewhere, a great variety of species. Among the dentirostral tribe of that order, native drawings exhibit sundry butcher-birds (genus *Lanius*) and flycatchers (*Muscicapa*, Linn.) Of the former we shall name only the *Lanius schach;* while of the latter the central figure of our wood-cut (see p. 420) represents a new Chinese species, allied to the well-known *Muscicapa paradisea*, but of a purplish copper-colour. The wreathed flycatcher of Latham (*Muscicapa Sinensis*, Gmel.) is also well known in that country.

Many thrushes are described as natives by the older writers; some of these however are orioles, while others belong to the genera *Pastor* and *Gracula*. A resplendent species (*Turdus violaceus*, Gmel.), with the feathers of the head, neck, breast, and wing-coverts steel-blue, and a white spot upon the wings, is well known in China, as is likewise another species of the same genus, called the spectacle-thrush (*T. perspicillatus*, Gmel.), so designated

* Marsden's Travels of Marco Polo, p. 343.

because its eyes are surrounded by a black circle bearing a fancied resemblance to a pair of spectacles.

We have reason to believe that the genus *Pitta*, or short-tailed crow (*Myothera* of Illiger), is not unknown in the countries now under consideration.

The bird named "Chinese starling, or blackbird," by Edwards (*Merle huppé de la Chine*, Buffon), is the crested grakle (*Gracula cristatella*, Linn.) It belongs to the modern genus *Pastor*; is highly esteemed as a singing-bird, and is often caged. We may here also name the mino-bird, or Indian grakle (*Gracula religiosa*), which we presume to be an inhabitant of China from the following indication by Du Halde, which cannot apply to any other species. "There is also a kind of bird, not unlike a blackbird, of a deep-blue colour, with long yellow ears about half an inch long, which speaks and whistles in perfection."* This songster is remarkable for the bare fleshy caruncles which extend from the back of the eye towards the occiput, and which are here called ears. It is also distinguished for the ease with which it learns to imitate the human voice.

We have ascertained the existence of several beautiful orioles in China, both from the inspection of private drawings, and the descriptions of travellers and systematic writers. But, as we are ignorant of all that regards their manners and economy, we do not deem it advisable to burden our pages by descriptive details. We shall pursue the same course with the swallow-tribe, and merely indicate a single species remarkable for its size, first described by Sonnerat.† It measures nearly a foot in length, is of a brownish colour, grayish-red beneath, the top of the head rufous, the throat and orbits white. It is in reality a swift (*Cypselus Sinensis*), the *grand martinet de la Chine* of the voyager just named.

Of the beautiful and melodious groups of *Sylviæ* and *Motacillæ* we could also enumerate many species. The long-tailed warbler (*Sylvia longicauda*, Gmel.) is described by Sonnerat as abounding among the Chinese shrubberies. He adds that it is very tame, and has an agreeable note. With the larks we have no other acquaintance than such as has been acquired from the drawings of the natives.

There is a small bird described by Buffon under the name of *olivette*, or *pinson de la Chine*, of a rufous olive

* Vol. i. p. 249. † Voyage, vol. ii. p. 199.

colour, beneath testaceous, the quill and tail feathers black, and yellow at the base. It is the *Fringilla Sinica* of Linnæus. Another species from the same country (*F. Sinensis*, Gmel.) is known under the name of Chinese siskin.

The small bird sometimes seen in Britain in a domestic state, and commonly called the Java sparrow (*Loxia oryzivora*, Linn.), is, we doubt not, an inhabitant of China, as we find it frequently represented in drawings from that country. It is alleged to do great damage to the rice-grounds near Batavia, where it is likewise a well-known species. It is called *hung-tzoy* by the peasants, and is easily recognised by its strong red bill, its black head, with a white spot upon the cheek, the general ashy hue of the body, and the rose-coloured femoral feathers and abdomen.

The Chinese sparrow of Edwards (*Loxia Malacca*, Linn.?) is, as its name implies, a native of the imperial dominions. It likewise occurs in the great Eastern Islands and in India, though in the latter country it is called *mungul*. Another species is the gray-necked grosbeak (*Loxia melanura* of Gmelin). We have also seen drawings of a third species which greatly resembles our common greenfinch; and it may here be noted, that the bullfinch of Albin (3. 68) is so called by a misnomer. It is an American species (*Emberiza ciris*, Linn.), certainly not yet recognised as inhabiting Eastern Asia.

Of crows, jays, and magpies, there are many species. "There are also," says Du Halde, "several sorts of curious birds; as ravens with white circles about their necks like a neckcloth, and starlings which have the resemblance of the moon upon their bills."* The former bird we presume to be the *Corvus Dauricus* of Pallas,† a species widely extended over Asia. In the island of Macao, there is a crow (so called) of a cinereous-gray colour, with the back and wing-coverts rufous. It is about a third less than our magpie, and is described by Sonnerat under the name of *Pie de Macao*. It is the *Corvus Sinensis* of the older systems.

The cyanean jay, or blue crow of Latham (*Corvus cyanus*), was first observed in Dauria by Pallas, and it is said to resemble our magpie both in its manners and mode of building. It occurs in China, as do also the following

* Vol. i. p. 249. † Itiner. vol. iii. p. 694.

species: *Corvus speciosus, auritus, rufus,* and *purpurascens.*

Several extremely beautiful magpies are found throughout the provinces, such for example as the red-billed species (*Corvus erythrorhynchus,* Gmel.) Its size exceeds that of our common kind, and the great length of its tail bestows upon it a more slender and elegant aspect. The prevailing colours are blue, with bars of black and white. It is often kept in aviaries, and is said to be highly prized on account both of its docility and beauty. This species likewise inhabits the Himmaleh Mountains, and there is reason to believe that it is fierce and tyrannical in a state of nature. Mr Shore states, that one which he kept in captivity, although it refused other food, pounced ferociously upon living birds (which were presented by way of experiment), and eagerly devoured them. When seen amid the foliage of trees, it forms an ornamental and conspicuous object, flitting from bough to bough, with its long and flowing tail, and its whole form full of vivacity in every movement.*

The Chinese magpie (*Pica Sinensis*), made known by the researches of General Hardwicke, and beautifully figured by Mr Gould, seems widely extended over tracts of land of very various character as to height and situation. It inhabits the higher portions of the Himmalehs, the plains at the base of those mighty mountains, and indeed a great part of the empire.† The Chinese jay (*Corvus Sinicus,* Latham), is another very splendid bird, which we have frequently seen represented in the native drawings. It bears a considerable resemblance to our common jay, but the black streak on the side of the head passes as it were through the eye, instead of underneath it.

A species of hoopoe is found in China. We have not yet ascertained whether it corresponds strictly with our rare European species (*Upupa epops*), or with the nearly-allied species (*Upupa minor* of Shaw), which is known to extend from Africa into Hindostan. Kingfishers are occasionally represented in their drawings; and we have no doubt that woodpeckers occur in many of the provinces, although we possess no information regarding them. There are several kinds of cuckoos. We

* Gould's Century of Birds from the Himalaya Mountains, plate 41.
† Ibid. plate 43.

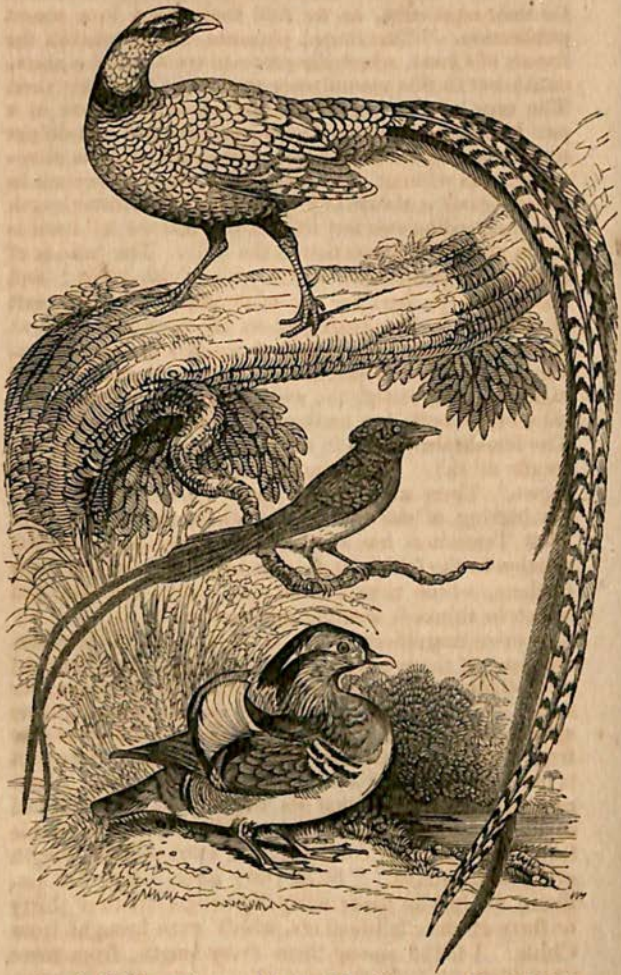
shall here merely name the *Cuculatus maculatus* of Gmelin, a large spotted species, with a lengthened tail, the body of a greenish-gray, varied with white and glossed with brown. It is banded beneath.

The great barbet (*Bucco grandis*, Gmel.), recognised in India under the name of *honest-face*, is a well-known inhabitant of the Chinese dominions.

In the southern provinces there are parrots of many species, but certainly not, as Du Halde states, "exactly resembling those of America," though they are allied to them in brilliancy of plumage, and in their aptitude to acquire the articulate tones of the human voice. In the vicinity of Nan-ning-fou there is a large species, which is easily taught to speak. The "green and red Chinese parrot" of Edwards (*Psittacus Sinensis*, Lath.), though supposed to have been brought originally from thence, does not appear to have been recently recorded as occurring in that country, although it was observed by Sonnerat in the Molucca Islands. The beautiful *Lori de la Chine* of Buffon* may also be regarded very doubtfully as a Chinese species.

Having now arrived at the *Gallinaceous* order, we may remark, that China is famous for the beauty and abundance of its pheasants; several of which are now so familiarly known among ourselves, that the slightest indication of them may suffice. The most gay and gorgeous of all is the *kin-ki*, or golden hen of the natives, our golden pheasant (*Phasianus pictus*, Linn.) A stronger and bolder bird is the silver pheasant (*Ph. nycthemerus*, Linn.), a native of the northern provinces of the empire, where it is frequently kept in a domestic state. Among ourselves a hardier and consequently more useful and abundant species is the common pheasant of the British covers (*Ph. Colchicus*, Linn.) It is said to have been originally introduced into Europe from the banks of the Phasis (the Rhion of the present days), a river of Colchis in Asia Minor, and is now naturalized over a great extent of territory. The ringed pheasant, though in this country it breeds freely with the common kind, and only differs in being marked by a semi-lunar spot of white upon the neck, is by most of the continental naturalists regarded as a distinct species, under the title of *Phasianus torqua-*

* Planches Enlum. p. 519.



Barred-tailed Pheasant. Cupreous Flycatcher. Mandarin Duck.

tus. We shall here mention M. Temminck's reasons for their separation, as we find them given in a recent publication. "The ringed pheasant chiefly inhabits the forests of China, where the common species is also abundant; but in this natural state they never breed together. The eggs of the ringed bird also differ; they are of a pale bluish-green, marked with small blotches of a deeper tint; while those of the common pheasant are of an olive-white, and without any spots. The ringed pheasant in its wild state is always of a lesser size, the extreme length never exceeding two feet five inches, and the tail itself is much shorter in proportion to the body. The head is of a whitish fawn-colour, tinted with bluish-green; and above each eye there are two white lines, forming a sort of eyebrow. The markings on the back are different and smaller, and the rump-feathers show the same peculiar tint which the mixture of fawn and greenish-blue exhibits; and, lastly, the white ring, broadest upon the sides of the neck, is a mark which never can be mistaken. The female also differs in her lesser size and comparative length of tail. The ground-colour of the plumage is brown. There are no dark spots upon the breast, and the barring of the tail is very distinctly marked; but what Temminck has observed to be the principal distinction in the female is a little band of thick and black feathers, which runs a short way under each eye, and which he thinks is wanting in the other."*

A more magnificent bird, at least in its dimensions, than any of the preceding, is the barred-tailed pheasant of Latham (*Ph. superbus*),† represented by the upper figure of the adjoining cut. It is an extremely rare species, even in the East, and is brought with great care from the confines of the empire to Pe-king, where it is preserved in the aviaries of the wealthiest class. Temminck is of opinion that its exportation is prohibited under the severest penalties. The most remarkable feature of this bird consists in the extraordinary length of the tail-feathers. "Some years since," says Dr Latham, "I had an opportunity of seeing a bundle of thirty or forty of their tail-feathers, which were brought from China: I found among them every length, from more

* Sir William Jardine's Naturalist's Library,—Gallinaceous Birds, vol. i. p. 193.

† Synonymous with *Ph. veneratus* of Temminck, Pl. col. 485.

than seven feet to eighteen inches."* The size of the body seems not to exceed that of the silver pheasant; and we may add, that it is the *chee-kai* of the Chinese, *kai* being a general term expressive of any species of the gallinaceous tribe. Mr Bennet informs us, that the beautiful tail-feathers are placed in the caps of players when acting military characters; but he remarks, that the natives do not venerate this bird, as was at first supposed.† It is, however superstitiously, believed that its blood is possessed of poisonous properties, and the mandarins, when in expectation of losing their rank and being suddenly put to death by order of the emperor, preserve some of it in a dried state upon a handkerchief, on sucking which they fall down and instantly expire.‡

The principal object of attraction to strangers at Macao is known to be the splendid aviary and gardens of Mr Beale, who, after a residence of upwards of forty years in that country, devotes his leisure to the cultivation of many of the most delightful productions of nature, both in the animal and vegetable kingdom. "On entering the large doors, which open from a narrow lane, the ear is saluted by various noises, proceeding from a number of caged birds inhabiting the verandah of the dwelling. The peculiar notes of the minas, the different screams of loris, parrots, and parroquets, the twitting of the smaller birds, are variously heard vying with each other in loudness; the occasional caw of the ætherial paradise-bird, or its resounding note of *whock, whock*, is also heard.§ The attention of the visiter is diverted from the elegant plumage of the birds to the beautiful flowers of splendid tints in the garden before the verandah, or placed in pots upon the balcony. This garden proves attractive to the gay but fickle butterflies that flit about the flowers, as well as to numerous wild birds."‖

Mr Beale first procured a living specimen of the barred-tailed pheasant (*Ph. superbus*) in 1808, and kept it in

* General History of Birds, vol. viii. p. 196.

† This circumstance (to say nothing of the law of priority, which decides in Mr Latham's favour) affords an additional reason for the non-adoption of M. Temminck's specific name of *veneratus*.

‡ Bennet's Wanderings, vol. ii. p. 56.

§ As the paradise-bird is in China an *imported* species (it is native to the Papuan Islands and New Guinea), we must, however unwillingly, exclude it from our present sketch.

‖ Ibid. p. 36.

a healthy state for thirteen years; but he was unable, after its death, to obtain another till 1831. Four specimens were then brought from the interior, and purchased for 130 dollars; and it was these, Mr Bennet is convinced, which were subsequently taken to England by Mr Reeves. The female is as yet unknown.

We may also here name the celebrated argus pheasant (*Ph. argus*, Lath., *Argus giganteus*, Tem.) as a rare and remarkable bird, of which China and the neighbouring provinces of Tartary are assigned as the native countries by various ornithological writers. This, however, requires confirmation, as all the specimens of which the origin is accurately known have been brought from the great Eastern Islands and the Peninsula of Malacca.* Though of late years well known in the *Basses-cours* of Batavia (from which M. Temminck received a series of splendid specimens), we are not aware that the argus pheasant has ever been imported alive into Europe. It would certainly prove a more magnificent addition than any which has been made to our aviaries in modern times. The great apparent size of the argus pheasant arises chiefly from the peculiar formation of the wings, of which the secondaries are three times the length of the quill-feathers, being nearly three feet long. In consequence of this unwieldy extent of that portion of the wing which is not under the power of much muscular action, the bird is alleged to be almost entirely destitute of the power of flight. Its pace, however, when running on the ground, is greatly accelerated, the expanded secondaries, according to M. Temminck, acting as powerful sails, and furnishing a very fleet and effectual mode of transportation. The body of this bird, when stripped of its feathers, scarcely exceeds that of a barn-door fowl; but in its "high and *plumy* state" it measures in total length about five feet three inches, the tail-feathers being themselves nearly four feet

* There is a passage in Marco Polo which may perhaps be construed in favour of the claims of North-western China to the bird in question. In his description of the kingdom of Erginul (a district of Tangout) he observes, "pheasants are found in it that are twice the size of ours, but something smaller than the peacock. The tail-feathers are eight or ten palms in length."—"This," observes the editor of the English edition, "is probably the argus pheasant, which, although a native of Sumatra (where I have frequently seen it alive) is said to be also found in the northern part of China."—Marsden's Travels of Marco Polo, pp. 225, 229.

long. Its plumage is greatly prized for various ornamental purposes, and forms in Java, and some other Eastern countries, a not unimportant article of commerce. The female, as is the case among most gallinaceous birds, is of much less conspicuous aspect than the male. She wants the long tail-feathers, and the secondaries are destitute of the peculiar breadth, and of the beautiful eye-like markings which so greatly distinguish her mate. In consequence, however, of her more homely appearance, she seems to have been less frequently sought for in her native forests, and is thus by far the rarer sex in the collections of Europe. M. Temminck, a celebrated ornithologist, thought himself fortunate in finding a brace of females among thirty males.

Another beautiful bird of the same order, which we have only recently ascertained to inhabit China, is the tragopan, or horned pheasant of Edwards and Latham, the *Tragopan satyrus* of Cuvier. Regarding the habits and natural economy of the little group to which it belongs we as yet know nothing, although their external aspect has been rendered familiar by the elegant representations of Mr Gould.* The species in question, though usually brought from Nepaul, had been ascertained to inhabit Thibet; and we were therefore not surprised to find that the specimens in Mr Beale's aviary were Chinese, from the mountainous province of Yun-nan.†

According to Du Halde, there are abundance both of wild and tame peacocks in the province of Quang-tung, from whence they are distributed to other parts of the empire. Does this indicate the gorgeous bird known to ourselves under the name of peacock? Or is it the peacock-pheasant of Sonnerat and Edwards, the *Polyplectron Thibetanus* of Gmelin? The latter is a species very frequent in the aviaries of the wealthier classes in China, where we doubt not the common peacock is also familiarly known, although we are more sceptical of its occurrence as a native bird. No doubt the nearly-allied species (*Pavo muticus*, Linn.) was first made known in the days of Ulysses Aldrovandus, from drawings transmitted to the Pope by the Emperor of Japan; but it has not been observed alive except in India and the great Eastern Islands,

* In his "Century of Birds from the Himalaya Mountains."
† Bennet's Wanderings, vol. ii. p. 61.

and we are not aware that it has ever occurred to the north of the Birmese territory.

The bird alluded to in the preceding paragraph (*P. Thibetanus*) is one of singular beauty. It is sometimes called the Iris peacock. One of its most remarkable characters consists in the tarsi of the males being armed with several spurs. It is said to be by no means wild even in a state of nature, becomes readily accustomed to confinement, and even breeds freely in captivity. It is a native of China, as well as of the mountain-ranges between Hindostan and Thibet.

Poultry, by which we mean the ordinary domestic cock and hen, are of course well known in the empire, and, as elsewhere, they have various breeds. In the province of Se-tchuen the inhabitants cultivate a peculiar variety, covered with wool like that of a sheep; they are very small, with short feet, and are great favourites with the ladies. In the days of Marco Polo they bred (in the province of Fo-kien) another variety, the skins of which were covered with black hair resembling the fur of cats.

Partridges and quails are common and of various kinds. The hackled partridge of Latham* (*Perdix ferruginea*) is regarded as an inhabitant of Eastern Asia, at least by those who consider it synonymous with Sonnerat's *grande caille de la Chine*. Latham's specimen, however, was supposed to come from the Cape of Good Hope. The feathers on the upper part of the neck are narrow and elongated, with the edges and a central line yellow. The tips are acute.

A small and beautiful species of quail (*Coturnix excalfactoria*, Tem., *Perdix Chinensis*, Lath.) is very abundant in China. The body above is brown, sprinkled with black spots and white lines; the throat is black, with a white arch; the central part of the abdomen chesnut. The Chinese breed this species, and keep great numbers of them in cages for the singular purpose of warming their hands with them in winter. It is also reared on account of its extremely pugnacious disposition, for the purpose of being fought, as cocks are in our own country.

The pearled partridge of Latham (*Perdix perlata*) is a common bird in those provinces. It is known there under the name of *Tahe-cou;* and as it is said to perch on trees, it may be regarded rather as a francolin than a partridge properly so called.

* General Synopsis, iv. 766.

The pigeon tribe, so generally diffused over all the warmer as well as temperate parts of the earth, has several beautiful representatives in the Chinese dominions. The rose-pigeon (*Columba miniata*, Tem.) is a well-known native, as is also the Surat turtle of Latham (*Columba tigrina*, Tem.) The latter is said to be partial to the skirts of deep forests, and is easily tamed. There are several different kinds of wood-pigeons, as well as of turtle-doves, in the island of Hai-nan, and many beautiful species of those sylvan tribes have been seen along the shores of the mainland, and in different parts of the interior.

Of the *Grallatores*, or wading-birds, such as herons, cranes, curlews, and plovers, there are various kinds in China, where the great abundance of fish, and quantity of moist land, afford a suitable supply of food. A woodcock was observed by one of the gentlemen of Lord Amherst's embassy, and several kinds of snipes are common. A species closely allied to the birds last named, and resembling our common snipe, though of somewhat richer and more varied plumage, is described by Buffon as the *bécassine de la Chine*.* It is the *Rynchæa Sinensis* of the modern systems.

Of the singular genus *Parra*, the Chinese Jacana of Latham (*Parra Sinensis*, Gmel.), is found both along the marine shores and the marshy plains of the interior. "This species," Mr Gould observes, "may be distinguished, not less by the grace and beauty of its form, than by its adaptation to the localities which nature has allotted it. Formed for traversing the morass and the lotus-covered surface of the water, it supports itself upon the floating weeds and leaves, by the extraordinary span of the toes, aided by the unusual lightness of its body. Like the moor-hen, of whose habits and manners it largely partakes, it is doubtless capable of swimming, the long and pendent tail-feathers being elevated when in that act, so as not to dip in the water. In powers of flight it appears deficient, the wings being short, and the quills terminated by a slender appendage proceeding from the tip of the shafts. This singular bird has been long known as a native of the low lands of India and China; but was not supposed, until its recent introduction from that quarter,

* Planches Enlum. 881.

to have been a native of the Himalaya, where it inhabits lakes and swamps among the hills."*

Of the plover tribe, from the same dominions, the only example we shall here adduce is the species usually known under the name of Goa lapwing (*Vanellus Goensis*). It is rather inferior in size to our pewit or common lapwing, although the great length of its legs and slenderer contour of body render it the more elegant and graceful bird of the two. It seems to enjoy a wide extent of geographical distribution in Asia, from the Indian possessions of Britain to the eastern provinces of the Chinese empire. It frequents moist and reedy places, and preys on small mollusca, worms, and insects.†

Of a genus so widely distributed as the terns or sea-swallows, we naturally expect to meet a few in China. The *Sterna Sinensis* is there a well-known bird.

On the lakes and rivers there are of course many kinds of wild-ducks and other waterfowl, in their natural and unreclaimed condition; and the manner in which these are often captured is ingenious, though well known. The sportsmen incase their heads in large gourds or calabashes, with holes for sight and respiration: they then walk or swim deeply in the water, so that nothing but the fruit is seen above the surface; and the unconscious ducks, accustomed to floating and innocuous calabashes, approach them without fear, and are respectively pulled under water, for the purpose of having their necks wrung, and being fastened to a poulterer's girdle. On the banks of the Yang-tse-kiang, and along the shores of the Po-yang-hou, during the progress of Lord Amherst's embassy, wild geese and ducks occurred in large flocks on both the lake and river, and were so tame that they might be approached within a few yards.‡

It is known that prodigious numbers of tame ducks are kept in the various provinces. The peasants hatch the eggs in ovens or in dung, and putting the young ones into boats carry them down to the seashore at low water; and as these boats keep company, there are consequently several flocks of ducks, not only near each other, but frequently intermingled, while searching for shellfish or other marine productions. Yet no sooner does the guar-

* Century of Birds from the Himalaya Mountains.
† Ibid. plate 78. ‡ Abel's Journey, p. 170.

dian strike upon a basin, than each flock flaps away to its own boat. Indeed, among the more singular sights to be seen in the neighbourhood of Canton, particularly about Wham-poa, are the *duck-boats*, which not only contain the aquatic bipeds, but are used as the dwellings of their owners. The ducks inhabit the hold, while the keepers are accommodated in the upper portion of the vessel. These boats are very abundant about the rice-fields near the river, just after the harvest has been gathered in, the birds at that period being able to glean a plentiful supply of food. Each owner moves his boat about from place to place according to the favourable opportunities that may offer for the feeding of his broad-billed flock. "On the arrival of the boat," says Mr Bennet, "at the appointed spot, or one considered proper for feeding the quacking tribe, a signal of a whistle causes the whole to waddle in regular order from their domicile across the board placed for their accommodation, and then rambling about undergo the process of feeding. When it is considered by their keeper that they have gorged sufficiently, another signal is made for the return of the birds: immediately upon hearing it, they congregate, and re-enter the boat. The first duck is rewarded with some paddy, the last is whipped for being dilatory; so that it is ludicrous to see the last birds (knowing by sad experience the fate that awaits them) making efforts *en masse* to fly over the backs of the others, to escape the chastisement inflicted upon the ultimate duck."*

The lowermost figure of our preceding group of birds (page 420) represents one of the most singular and admired of the Chinese waterfowl. It is the *Anas galericulata* of naturalists, commonly called the mandarin-duck; is considered a native both of China and Japan; and is often reared in those countries on account of its beauty. Little, however, is known of its manners in a state of nature. It is frequently brought alive to England, but its preservation in our cloudy clime requires the greatest care.

There is a large web-footed bird, intermediate in size between the goose and swan, which is now well known in our own country in the living state. It varies in colour, but has always a large knob at the base of the upper mandible, and a dark-brown or blackish stripe running down

* Wanderings, vol. ii. p. 115.

the back part of the neck. This species is more noisy than the common goose (with which it is said to breed), and cackles at the least alarm. Its original country is somewhat doubtful, and we mention it here because it is often called Chinese. It is the *Anas cygnoides* of Linnæus.

One of the most remarkable water-birds of China is the famous fishing-cormorant (*Pelicanus Sinensis*, Lath.), called *leu-tse* by the natives. It is delineated by Sir George Staunton,* and described as being smaller than our cormorant, with a yellow beak, blue irides, the prevailing colour of the plumage brownish-black, the chin white, the body whitish beneath, and spotted with brown. It is very abundant, and is trained to catch fish, as we shall mention more particularly in a future portion of this chapter.

Of the reptile tribes our knowledge is still extremely scanty. Marco Polo has given a curious but distorted account of some "huge serpents," which inhabit the province of Karazan, now supposed to form the western portion of Yun-nan. They are ten paces in length, with a girth of ten spans, and at the fore-part of their bodies they have two short legs with three claws, like those of a tiger; their eyes are larger than a fourpenny loaf (pane da quattro denari) and "very glaring." The jaws are wide enough to swallow a human being, the teeth large and sharp, and the whole appearance so formidable that neither man nor beast can approach them without terror. During the heat of the day they lurk in caverns, from whence they issue forth at night in search of food, and whatever animal they meet with, whether wolf or tiger, they devour. By their motion along shore, and their vast weight, they make a deep impression as if a heavy beam had been drawn along the sands. Those who hunt them observe the track which seems most frequented, and fix in the ground several pieces of wood, armed with sharp iron spikes, which they carefully cover with sand. When the reptiles creep forth during the darkness of the night to their accustomed haunts, they are either mortally wounded by the concealed weapons, or so injured as to admit of their being speedily killed. The gall is highly esteemed in medicine, and is used for a great variety of important purposes, such as curing the bite of a mad dog, and ac-

* Embassy, vol. ii. pp. 388, 412, plate 72.

celerating the pains of parturition. Its flesh, also, as an article of food, is regarded by all as a great delicacy.* Though no mention is made of the hinder extremities, and the number of toes is incorrectly stated, the reader will not fail to perceive in this exaggerated report an obvious indication of the crocodile.

Near the city of Hoang-tcheou, great numbers of various-sized tortoises are taken, and disposed of to the nobility, who keep them for the purposes of amusement in their gardens and pleasure-grounds. In Quang-tung these reptiles are said to attain an extraordinary size.

Serpents, especially a speckled kind, found near the city of Nan-yang, are used by the Chinese physicians as a remedy for palsy. With this view they steep them in phials of wine. Snakes of a monstrous size occur in the island of Hai-nan, but they are extremely shy, and not regarded as dangerous. It is otherwise, however, with a snake, not uncommon in that country, of which a specimen was presented at Canton by Dr Cox to Mr Bennet. It had some time previously bitten a Chinese servant in the Dutch Hong, and occasioned his death in a few hours. Its head had been cut off by the person who first came to the assistance of the wounded man. He bruised and applied it as a poultice to the bitten part; that is to say, he probably mingled an additional portion of poison with the life-blood of the patient, and thus in all probability accelerated his death. This reptile is named *pak-y-hak*, on account of its colours, which are black and white. It never exceeds the length of three feet. The individual just mentioned was described to Mr Bennet as a robust and healthy man. He was bitten on and about the little toe, at eleven P. M., and was quite senseless in an hour. At first, however, he was able to describe the pain, which he said ascended rapidly up the body. When first bitten he mistook his assailant for a rat, and, kicking at it, was unfortunately twice re-bitten. He expired between three and four A. M. "During floods," says Mr Bennet, "these reptiles are very commonly seen about the houses, coming from the creeks up the drains into the kitchens: they very probably inhabit marshy places, and are often brought down during the freshes of the river, among the weeds, rushes, &c., and at that time may be descried sporting and swimming about the multitude of

* Marsden's Travels of Marco Polo, p. 430.

boats in the river. They are killed in numbers by the boatmen. During the late floods which prevailed at Canton, a number of these venomous reptiles were destroyed."*

In many places, the rice-fields on the banks of the canals abound with snakes, apparently of two species, the largest of which resembles very closely the one common in Great Britain. It is, however, of much larger dimensions, being found from three to six feet in length. The smaller kind is transversely striped with black and white, and does not exceed the length of eighteen inches.†

The ichthyology of China is no doubt extremely rich, but it has been very little methodized, and our present limits will only admit of our recording a few miscellaneous notices.

The seacoast of the province of Tche-kiang yields a great supply of fish, besides numerous shellfish and good lobsters. In the beginning of summer they catch the *hoang*, or yellow fish, a species much sought after on account of its delicate flavour. As this kind does not keep long out of the water, the natives are careful to put them into glass vessels, and thus transport them throughout the empire. Near a city of the same province (Tai-tcheou by name) they catch a species of thornback (Raja?), the skin of which is used for many purposes, and especially for making the scabbards of cutlasses. With this skin a considerable trade is carried on throughout the country, and it is even exported to Japan. Fish of various kinds are likewise very plentiful along the coast of the province of Quang-tung, where there are also all sorts of "oysters, lobsters, and very good crabs."‡

Both the Yang-tse-kiang and Po-yang-hou produce a great abundance of excellent fish, and carp and mullet were plentiful in the markets of all the towns on the banks of these waters visited by Lord Amherst's embassy.§

A small blue fish, said to resemble a dolphin, and found among the rocks along the seacoast, is held in great esteem.

The rivers, lakes, pools, canals, and even ditches, are full of fish; and there are boatloads of water containing spawn, which is carried to distant parts, where it cannot naturally be so easily procured. The young fry, when

* Wanderings, vol. ii. p. 117.
† Abel's Journey, p. 154.
‡ Du Halde, vol. i. p. 237.
§ Abel's Journey, p. 171.

so small as to be almost imperceptible, are fed with certain lentils, which flourish in the marshes, or with yolks of eggs. The larger fish are preserved in winter by being frozen (just as our northern fishermen now pack their salmon in ice for the London markets), and are sent in boats from distant provinces as far as Pe-king.

However ignorant we may be of the detailed ichthyology of China, we may safely aver, from what is now known of the general laws of zoological geography, that Du Halde is in error when he asserts that there are no sorts of fish found in Europe which do not likewise occur in that country. Of these he instances lampreys, carp, soles, salmon, trout, shad, and sturgeon. We follow him more implicitly when he adds, "and also a great many others of an excellent taste, quite unknown to us."* Of the latter, one of those in greatest esteem is called *tcho-kia-yu*, or the armour-fish, on account of its being covered by very hard sharp scales. It is admirable eating, being very white in the flesh, and of a flavour somewhat resembling that of veal. It weighs about forty pounds. Another species, captured abundantly in calm weather, and esteemed a great delicacy, is called *meal-fish* by the natives, on account of its extraordinary whiteness. The dark pupils of its eyes are surrounded by two circles resembling the brightest silver. It occurs along the shores of the province of Kiang-nan; and four hundred-weights are sometimes taken at a single draught.

According to the authority last quoted, one of the best fishes in all China is caught during the fourth and fifth moon, and resembles a sea-bream. It weighs five or six pounds, and is usually sold for little more than a farthing a-pound, and for as much again twenty leagues up the country. When the fishing of this kind is concluded, there arrive vast quantities of fresh fish resembling cod from the coasts of Tche-kiang. Of these the consumption is immense along the shores of Fo-kien and Shan-tung; and there is, moreover, a great quantity salted in the province where they are caught. Besides these *cod-fish*, as Du Halde calls them, there is carried into various parts from the seacoasts, during the sixth, and ninth, and intermediate moons, a prodigious supply of other fish salted. In the province of Kiang-nan, a very large fish is brought from the Yellow River and the sea, and which

* Du Halde, vol. ii. p. 238.

is taken by means of extensive flat meadows, covered by water, but so ingeniously contrived as to be capable of being suddenly left bare, as soon as a certain number of them have entered those treacherous shallows.

A great variety of excellent fish are said to be captured in the Yang-tse-kiang, opposite the city Kieou-kiang, where it measures almost two leagues across. Of these, the *hoang-yu*, or yellow fish, before alluded to, though of exquisite flavour, is still more remarkable for its enormous size; as it sometimes attains the weight of 800 pounds, and is of a very firm consistence. It is only caught at certain seasons of the year, when it issues from the Lake Tong-ting into the river just named.

Besides the ordinary modes of fishing by net and line, the Chinese are known to practise a more curious and singular device, by means of the diving-bird, called leu-tse (*Pelicanus Sinensis*, Lath.), already mentioned. "In the morning, when the sun rises, one may see on the rivers a considerable number of boats, and several of these birds sitting on the sides; the fishermen turn their boats about upon the river, and at the signal which they give, by striking one of their oars on the water, the cormorants fly into the river, plunge over-head, and, diving to the very bottom, seize the fish by the middle, then coming up again, they carry it to the bark, where the fisherman, receiving it, takes the bird, and holding her legs uppermost, makes her disgorge the small fish which she had swallowed, by passing his hand along her neck, on which there is a ring at the lower part, which hinders them from going directly into the crop. When the fishing is quite over, they take away the ring, and let them feed; and when a particular fish is too large for one, they assist each other,—one takes the tail, and another the head, and bring it to their master."*

Sir George Staunton (who gives a drawing and description of the bird in question), during his journey to Hang-tcheou-fou, observed on a large lake, close to the canal, thousands of small boats and rafts, built entirely for this kind of fishing. On each boat or raft there were ten or twelve birds, which plunged into the water at a signal from the owner, and he was astonished at the enormous size of the fish with which each ascended in its beak. These individuals were so thoroughly broken in to the service

* Du Halde, vol. ii. p. 244.

of their masters, that they did not require either cord or ring about their necks to prevent their swallowing the prey. They took thankfully what was afterwards given in reward, and were satisfied. We do not see why the same mode of fishing might not be practised with advantage in Britain. Our own cormorants are stronger, and dive as well as the Chinese. They are very easily domesticated, and, although exceedingly voracious, their constant desire for food would, under proper training and control, prove the essential groundwork of a useful character. We have seen tame cormorants belonging to the fishing-villages on the east coast of Scotland, which went off regularly to feed in the neighbouring bays, but would return again when called to from the shore by those with whose voices they had become familiar. They no doubt did so in expectation of receiving rather than of bestowing a reward; but we do not believe that they possess a less accommodating instinct than those of the Celestial Empire, or that the same attention to their education would not be attended by similar results. In our Alpine lakes especially, so richly stored with delicious trout, and whither boats can scarcely be conveyed, the services of a well-trained cormorant would be incalculable; for on many a breathless summer day, "even in the grim and sultry hour of noon," the angler seeks in vain to ply his trade. He succeeds in breaking the translucent mirror, and in discomposing the fairy reflection of cloud and crag, yet the finny tribes remain secure amid the unseen depths of that inverted sky. But the swift, silent, and insidious bird, pursuing unobserved the "noiseless tenor" of its watery way, would soon secure them with tenacious bill.

It appears, indeed, that no nation on the earth puts in practice a greater variety of modes for catching fish than the Chinese. We shall mention another method, which, though not obviously natural, they are said to find both easy and successful. They nail on each side of long narrow boats a plank two feet broad, covered with white shining japan, and placed by a gentle inclination, so that its lower edge just touches the surface of the water. This device is used at night, with the intent that the reflection of the moon should increase its deceptive influence; and whether the fish which are sporting around are dazzled by the splendour, or merely mistake the lustrous plank for the sparkling water, we do not pretend to say, but

simply report the fact, that in their moonlight gambols great numbers either fall upon the plank and are secured, or fairly vault into the body of the boat. Nor is this all. In some places the soldiers have even acquired the dexterous art of shooting fish with bows and arrows. To the arrow a long piece of packthread is attached, by means of which, when the fish is pierced, it is drawn to hand. In other places the muddy bottoms are so replenished with the finny tribes, that men standing up to the girdle in the water, strike them with a fizgig.* Besides these various devices, another is in general use, and consists in stretching out a net on four pieces of bamboo, suspended by a long pole.†

The Chinese are known to follow the singular practice of hatching the eggs of fishes *under fowls*. For this purpose they collect the spawn from lakes and rivers, place it in vessels, and dispose of it to the proprietors of ponds. When what is called the hatching-season arrives, they empty a hen's egg of its natural contents, and substitute for it the gelatinous spawn. The opening is then closed up, the egg is put under its natural parent, and is, after a few days, removed, re-opened, and placed in a vessel of water warmed by the heat of the sun, where it is kept till the young fish are developed, and acquire sufficient strength to bear the ordinary temperature of the larger masses of fluid.‡

The *culture* of fish is likewise alluded to by Du Halde, although he makes no mention of any such extraordinary mode of hatching. "The great trouble which the missionaries had in settling the geography of the country, did not allow them time to inquire very minutely into the several species of fish which are found in their rivers and canals; however, they observed two or three things which are singular enough. The first is, that in the river Yang-tse-kiang, in the province of Kiang-see, there is an assembly of a great number of boats, at a particular season, to purchase the spawn of fish. In the month of May the country people place mats and hurdles across the river, leaving only room for the passage of the boats; these hurdles stop the spawn, which, together with the water, they convey into proper vessels, and expose to sale. By this means, and keeping the vessels in agita-

* Du Halde, vol. ii. p. 245. † Staunton, vol. iii. p. 334.
‡ Bulletin Universel, 1829, p. 82.

tion, it is conveyed into divers provinces, in order to stock their ponds and pools. In a few days the young fry begin to appear in little shoals, but the different kinds cannot be so soon distinguished. The advantage they reap from this is vastly more than the expense they are at, for the common people live much upon fish."*

Lacépède has slightly described, from the MSS. of Commerson, a fish from the Eastern Seas, of a general green colour, with a cast of silver. He calls it *Sphyræna Chinensis*, and Shaw has classed it with the pikes. The *Sphyrænæ*, in fact, belong to the abdominal *Percidæ*, although they bear a strong general resemblance to the other. The Italians indeed still call them *lucii marini*, probably on account of their long and pointed teeth.

It is known that many fishes (notwithstanding their being as a class correctly characterized as *mute*) are remarkable for giving utterance to a peculiar sound called *drumming*. This is very perceptible in the famous *maigre* of the Mediterranean (*Sciæna aquila*, Cuv.), a fish which swims in troops, and often utters a low bellowing sound beneath the waters. The noise may be heard from a depth of twenty fathoms, and is rendered stronger by placing the ear upon the gunwale of the boat. We allude to the phenomenon in this place, because Mr John White, an American lieutenant, who published (in 1824) a voyage to the China Seas, relates (pp. 187, 188) that, being at the mouth of the Cambodia, a river which traverses in part of its course the province of Yun-nan, himself and crew were extremely astonished by certain unaccountable subaqueous sounds, which they heard proceeding from beneath and around the vessel. These sounds were various though commingled, and were likened to the bass notes of an organ, the sound of bells, the croaking of frogs, and a pervading twang, which the imagination might have attributed to the powerful vibrations of some enormous harp. For a time the mysterious music swelled upon them, and finally formed a loud and universal chorus all around. But as the vessel ascended the river the sounds diminished in strength, and erelong altogether ceased. The interpreter stated to Lieutenant White, that the marine music which had so surprised them was produced by a troop of fishes of a flattened oval form, and which possess the faculty of adhering to various

* Vol. i. p. 27.

bodies by their mouths. It would, as Baron Cuvier has observed, form a curious subject of research to ascertain by what organs these sounds are produced at so great a depth, and without communication with the external air. The illustrious naturalist further remarks, that such of the *Scienidæ* as are the most remarkable for the faculty in question have the swimming-bladder very large and thick, furnished with extremely strong muscles, and in several species provided with more or less complicated prolongations, which penetrate between the intervals of the ribs. But what renders the phenomenon the more unaccountable is, that these swimming-bladders have no communication with the intestinal canal, nor in general with any part of the exterior.*

The Chinese perch (*Perca Chinensis*, Gmel.) is classed as a *Sparus* by Shaw. Of the latter genus, Lacépède describes several species (*Sp. cardinalis, Sinensis*, &c.), on the authority of native drawings, in a volume which once belonged to the Prince of Orange.

It has been observed, that the seas of the torrid zone have no cause to envy the productions of those sunny shores which they have so long bathed with their translucent waters. If the equatorial lands possess among their feathered tribes the brilliant creepers and the lustrous humming-birds, the oceanic waters contain countless thousands of the finny race, which surpass even these in splendour. The *Chætodons*, in particular, form a family on which nature seems to have bestowed her ornaments with a most lavish hand. "The deep purple of the iris, the paler richness of the rose, the azure-blue of the 'crystalline sky,' the darkest velvet black,—these hues and many more are seen commingled with metallic lustre over the pearly surface of this resplendent group. The eye of man receives the greater pleasure from their contemplation, in as far as being of moderate size, and haunting habitually the rocky shores, at no great depth of water, they are seen to sport in the sunbeams, as if desirous to exhibit their splendid liveries to the greatest advantage in the blaze of day."† Of the tribe alluded to, several of the most remarkable and magnificent inhabit the southern seas of China. We may name the imperial chætodon (*Ch. imperator*, Bloch), called the Emperor of Japan by

* Hist. Nat. des Poissons, tome v. p. 198.

† Encyclopædia Britannica, 7th edition, vol. xii. p. 178.

the Dutch. It is one of the most celebrated for the singular splendour of its aspect. Its body is deep-blue, traversed all over by about two and thirty narrow bands of orange-yellow. The pectoral fins are black, and the entire tail bright yellow. It is rather a large fish of its kind, sometimes attaining the length of fifteen inches; and as an article of food, is one of the most esteemed of all the southern species, almost rivalling, it is said, in flavour our own much-prized salmon.* There is another Chinese species, of a yellowish-white colour, with oblong body, covered by several brown stripes, and a round spot upon the gill-covers. It is the *Chætodon Chinensis* of Bloch. One of the most singular of the tribe, however, is a small fish (the *Chelmon rostratus* of Cuvier), of six or eight inches in length, remarkable for the following peculiarity:—It preys on flies and other winged insects, and no sooner perceives one of these, either hovering near the surface, or settled on an overhanging twig or blade of grass, than it ejects upon it a drop of water from its tubular snout, and with sufficient force to drive it into the water. In shooting at a sitting insect, it usually approaches cautiously within a few feet before it opens its aquatic battery. Schlosser (after Hummel) has described this curious device,† and it has since been confirmed by Reinwardt and various other observers. It is even said to be an amusement of the Chinese in Java to keep this species in confinement, with a view to observe its dexterity in the practice of this admirable instinct. They fix a fly or other insect to the side of the surrounding vessel, when the chelmon immediately bombards it with such precision as rarely to miss the mark.‡

The *Coryphænæ*, or dolphins, are justly regarded as among the most beautiful of all the inhabitants of the sea. When swimming embodied near the surface, and glittering beneath the light of a cloudless sky, they seem effulgent with the richest gold, and the starry lustre of the topaz and sapphire. Bosc observes, that it is necessary to have seen them accompanying a vessel in troops before

* The genus *Chætodon*, as originally constituted, consisted of various groups, which are now regarded as distinct genera. The species above alluded to belongs to the genus *Holacanthus* of Lacépède.

† Philosophical Transactions for 1764.

‡ Encyclopædia Britannica, 7th edition, vol. xii. p. 178.

we can form a proper estimate of their exquisite beauty. The works of the great Creator are indeed every where sufficient to excite our unfeigned admiration; but such rich exhibitions come upon us with a fresher feeling of surprise, when seen amid "the melancholy main," with nothing else for weeks around us than the blue expansive sky and the heaving waves of the monotonous ocean. The only Chinese species which we at present bear in mind, is that described by Lacépède, under the title of *Coryphene Chinois*,* from a native drawing, forming part of a volume in the collection of the Prince of Orange, and said to have been presented to France soon after the establishment of the National Museum.†

The fish called *black pomfret* in India (*Stromateus niger* of Bloch) seems to possess a rather singular geographical distribution. Although it is known along the greater portion of our Indian shores, and extends as far as those of China, it does not occur at the Isle of France, nor in any part of the Indian Archipelago. It is a delicious fish for table-uses; and it is this species which, according to Russel, is abundant at Vizagapatam during the months of March and April. He adds the curious fact, that it vanishes and reappears alternately every two or three days. It requires to be eaten immediately after capture.

Several species of the genus *Labrus* are native to the seas of China.

The genus *Fistularia* of Linnæus derives its name from the long tube-like muzzle, common to all the *Fistularidæ*. In the restricted genus, called *Aulostoma* by Lacépède (from αυλος, a flute, and στομα, mouth), the tube of the muzzle is rather short, large, and compressed. There is only a single species known, commonly called the Chinese pipe-fish (*Fistularia Chinensis*, Bloch).

The beautiful species commonly called the *gold-fish* (*Cyprinus auratus*), the most brilliantly adorned of all fresh-water fishes, and scarcely surpassed even by the more richly ornamented inhabitants of the ocean, is a well-known native of the Chinese dominions. It is said to have been originally confined to a lake in the vicinity of the mountain Tsien-king, in the province of Tche-kiang, near the 30th degree of north latitude, from whence it has been distributed, not only over all other parts of

* Tome iii. p. 209.

† Shaw's General Zoology, vol. iv. p. 226.

the empire, but into most countries of the civilized world. It appears to have been first brought to England towards the close of the seventeenth century, where, however, it remained very scarce for more than thirty years; after which (about 1728), a considerable number being imported, the species became more plentifully diffused. In its native country no pains are spared (especially by the ladies) in its cultivation. These fair and feeble-footed damsels are assiduous in their attentions to a creature so beautiful in itself, so pleasing in the perpetual liveliness of its movements, and so interesting for the ease with which it may be rendered susceptible of a certain degree of familiarity and attachment. "Large glass and porcelain vessels of the richest kind are prepared for its reception in their apartments, and small ornamental ponds and basins in their gardens."*

The gold-fish is said to be extremely long-lived. Mr Van Braam informed Dr Shaw, that during his stay at a town near Pe-king, he was shown several in a little pool, of which the smallest were fifteen inches long, and the rest a great deal larger. The mandarins assured him, that these fishes were of great age.† Though native to a comparatively genial clime, they now breed freely in all the temperate parts of Europe, and in some respects appear to be extremely hardy.‡

This species seems to have been described by Father Le Comte before its introduction to our own districts of the world; and his observations, Du Halde observes, "will not be useless whenever there is an attempt to bring the golden-fish into Europe, as the Hollanders have already done into Batavia." As these early notices regarding the treatment of this celebrated fish in its native regions may interest the reader, we shall here subjoin an extract.§

* Shaw's General Zoology, vol. v. p. 209. † Ibid. p. 211.

‡ Host, a naturalist of Vienna, observed a gold-fish revive after it had been frozen up in ice during a winter night in the vicinity of Austerlitz. The great object, however, to attend to in the formation of ponds for this species is, that the water should be of sufficient depth to remain unfrozen except at the surface.

§ "These fish are commonly the length of one's finger, and proportionably thick; the male is of a beautiful red from the head halfway down the body, and the remaining part seems to be gilded, but in such a manner that our best performances of that sort are much inferior to it. The female is white, and has the tail and some parts of the body perfectly like silver; the tail of each is not smooth and flat, like that of other fish, but makes a kind of a tuft, thick as

Bloch describes a fish under the name of *Clupea Sinensis*, or Chinese herring, the exact nature of which we have not at present the means of ascertaining.

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well as long, and adds new beauty to this little creature, whose body is otherwise well proportioned.

"Those who feed them ought to take great care, because they are exceeding delicate, and sensible of the least injury from the weather. They are put in a deep large basin, at the bottom of which they are wont to turn an earthen pan upside down, with holes in it, that in the heat of the day they may have a shelter from the sun; they also throw upon the surface of the water a certain kind of herb, which keeps it always green and cool; this water is changed three or four times a-week, but in such a manner that the fresh enters in while the old is going out. If they are obliged to transport the fish from one vessel to another, they take great care not to touch them with their hand, for those which are touched die soon after, or are in a languishing condition; therefore they make use of a small net, fastened to a round piece of wood, hollowed in the middle like a circle, with which they gently lift them up, and the threads are so close together that it does not let the water quite out before they are put into fresh. A great noise, like that of guns or thunder, or a strong smell, or a violent motion, is very prejudicial, and sometimes kills them; for I have often observed upon the sea, when we had some of them with us, that this was the case every time a great gun was fired; besides, they live upon almost nothing; the imperceptible worms that are bred in the water, or other things of the like nature, are sufficient to keep them alive, and yet they cast now and then small bits of paste into the basins; but there is nothing better than wafers, which, being soaked, make a kind of soup that they are extremely fond of, and which is in reality very proper for such delicate creatures.

"In hot countries they multiply very much, provided they are careful to take away the spawn that swims upon the surface of the water, which otherwise they would devour entirely. They place the spawn in a particular vessel exposed to the sun, and keep it there till the heat hatches the young fry; they are at first quite black, but change by degrees to red or white, with gold or silver, according to the different kind; the gold or silver begins to appear at the end of the tail, and extends by little and little towards the middle of their bodies, according to their particular disposition."—From Father Le Comte, as quoted by Du Halde, vol. ii. p. 241. We may here note that the gold-fish, like all other creatures, being subjected to the modifying influences of domestication, exhibits several variations in form and aspect. For example, the telescope-carp (*C. macrothalmus* of Bloch), remarkable for its extremely protuberant eyes, is not now regarded as distinct from the species in question, and the same may be presumed of the *Cyprinus quadrilobus* of Lacépede. We shall only further add, that the Christian father just quoted is in error when he asserts that the female is characterized by being white or silvery. She is usually, like the male, of a ruddy golden hue, although both sexes are liable to assume the pale or silvery aspect.

There is a small flounder found in the Chinese Seas, of a brownish colour above, and white beneath; the tongue is remarkable for its roughness, and the rays of the dorsal and anal fin are so extremely numerous as to be counted with difficulty. It is the *Pleuronectes Japponicus* of Gmelin.

Among the *Plectognathous* order of fishes, we find along the shores a representative of the singular genus *Balistes*, or file-fish. It is the *B. Chinensis* of Bloch, a small cinereous species, with orange spots. The species in general occur in vast numbers in the torrid zone, among rocks nearly level with the surface of the water, where they shine with a brilliant lustre resembling that of the beautiful chætodons before alluded to. Their flesh, however, at no time much esteemed, is said to become dangerous as food when they themselves are nourished by the polypi of the coral-reefs. Baron Cuvier, at the same time, states, that in such specimens as he had occasion to dissect he found nothing but the remains of marine vegetation.

Of the chondropterygian or cartilaginous fishes, which contain the sharks, so justly the dread of mariners in all the warmer seas, China furnishes a few examples. The upper figure of the annexed engraving exhibits the *Cestracion zebra*;* the larger of the lower figures represents a fine species of skate, the *Rhina acylostoma* of Bloch and Schneider; while the smaller figure to the left is intended to pourtray a species of a different order, the *Leucosoma Chinensis* of Mr Gray.†

With the molluscous and testaceous animals of China we have as yet a very incomplete acquaintance. Considerable quantities of shells were said to have been found by the late Dr Abel on the banks of the canals. The most common was a species of *Paludina*, allied to *P. tentaculata* of Lamarck (*Helix tentaculata*, Linn.), and for which Dr Leach proposed the name of *P. Sinensis*.‡ The Chinese are said to have a method of forcing the *Mytilus cygnus*, or swan-muscle, to produce pearls, by throwing into the shell, when it opens, five or six minute mother-of-pearl beads strung on a thread. In the course of a year these are found covered with a pearly crust,

* Zoological Miscellany, p. 5. † Ibid. p. 4.
‡ Abel's Journey, p. 155.

Cestracion Zebra. Leucosoma Chinensis. Rhina Acylostoma.

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which perfectly resembles the real pearl.* Marco Polo states, that near the city of Kain-du† there is a large lake of salt water, in which are found abundance of pearls of a white colour, but not round. "So great indeed is the quantity, that if his majesty permitted every individual to search for them their value would become trifling; but the fishery is prohibited to all who do not obtain his license."‡ This account is confirmed by Father Martini, who, speaking of the productions of the same province, enumerates "plusieurs pierres précieuses, et des perles." We know that quantities of pearls of a pinkish hue, but well formed and of large size, are found in Japan. Yet so far as China is concerned, a considerable importation of them takes place from India and Ceylon.

In the subjoined note the reader will find a short list of Chinese shells.§ We now proceed to a slight notice of the insects.

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* Quarterly Review, vol. xiv. p. 31.

† Supposed to be the modern Yung-ning-tou, in the northern part of the province of Yun-nan.

‡ Marsden's Travels of Marco Polo, p. 420.

§ We owe the following enumeration to David Falconar of Carlowrie, Esq., a skilful conchologist. Those with an asterisk attached are in his collection.

Fresh waters of China:

Symphynota magnifica
bialata
Glauconome Chinensis*
Cyrena fluminea
fuscata
Cytherea gibbia*
Argonauta nitida
Ricinula digitata*
Turbo cidaris*
cornutus*
imperialis*
Scalaria pretiosa*
Turritella dimidiata*
crenulata*
terebra*
Strombus cheragra*
marginatus
latissimus*
sulcatus
Rostellaria rectirostris
Volvaria monile*
Tornatella solidula*
Mitra plicaria*
Voluta Melo
Dolium Chinense*
Nassa arcularia*
Cypræa cribraria*
gangrenosa*
pustulata*
Ovula volva*
birostris*
Halyotis asinina*
Iris*
Calyptrea tectum Sinense*
Dolabella Rumphii*
Carocolla labyrinthus
Anostoma depressa
Pupa sulcata
*Planorbis cornu arietis**
Lymnæa luteola
acuminata
Pirena terebralis*
Navicella elliptica*
lineata
tesselata*
Ampullaria effusa*
Auricula scarabæus*

Of the beautiful and sparkling genus *Cicindela*, several examples are found in China, such as *C. aurulenta* and *Chinensis*. Of the great genus *Carabus*, we are not aware that any specimen has hitherto been brought from that country; but as we know that a great many occur in Siberia and the south of Russia, we cannot doubt that several must also inhabit the central and northern provinces of China. The nearly-allied genus *Calosoma* (which, though much less numerous than the preceding, is likewise widely spread over both the old world and the new) presents us with one Chinese species, first made known we believe by Mr Kirby, and named *C. Chinense* by that distinguished entomologist. The genus *Chlœnius*, which seems also to occur over the greater part of the world, and is well known throughout Russia, Siberia, and the Birman Empire, undoubtedly inhabits, though it has not yet been detected in, the Chinese dominions. It may, however, be stated as a general fact, that either from their rare occurrence, or more probably from the want of opportunities for collecting them, very few examples of any of those genera which compose the great division of carabideous insects (*Carabici*, Lat.) have as yet been added to our collections from the country now under consideration. Out of 2494 species of carabideous genera contained in the cabinet of Comte Dejean, scarcely half a dozen are known as natives of China.

A still stronger fact may be mentioned,—not in illustration of Oriental entomology, but rather of our ignorance in respect to it,—that of the great tribe of water-beetles (*Hydrocanthari*) of which the old genera *Dytiscus* and *Gyrinus* form the principal component portions, not a single Chinese example occurs in the collection above named. Yet we cannot doubt that a tribe which yields above 200 species in Britain alone, and occurs in all other known countries from Davis' Straits to Van Diemen's Land, must be abundantly distributed over regions so amply watered as those in question. We have ourselves received several species from China.

In relation to the brachelytrous tribes (*Staphylinus*, Linn.), the naturalist who knows how characteristic these insects are of the temperate or somewhat northern countries of Europe,—how greatly they swarm in Britain (about 800 species having been already collected in our

island), and how rare they become in continental India, as well as in Java and the Eastern Archipelago, will be less sanguine in his expectations regarding the abundance of Chinese species. The tribe is indeed too widely spread and extensive to be entirely excluded from any very large portion of the globe, but it is probably rare in the Celestial Empire.

Of the magnificent *Buprestidæ*, which form so gorgeous a feature in our entomological cabinets, we may name as a well-known specific variety the *Ludius fulgens* of Latreille. *B. vittata* is another imposing species from the same country, of considerable size, and great richness of aspect, being of the brightest golden green, with varied reflections of blue and flame-colour. The singular character of the Chinese people is, in some measure, exhibited by their fondness for beautiful insects, "little cages with living specimens of shining and splendid beetles (*Buprestidæ*) and of chirping cicadas being exposed in the markets, and hung in the drawing-rooms for the amusement of the wealthy."* Yet the entomological collections exposed for sale at Canton are extremely poor and defective. The species are few in number, indifferently preserved, and always transfixed by long eyeless needles of large size and rusty condition, and usually too long for the wretched boxes in which they are contained. These close imperfectly, and their contents are thus often injured by dust and other destructives.

Of the lamellicorn beetles, which amount in Dejean's collection to upwards of two thousand species, we receive but a small number from China. Of these we shall mention a few:—*Copris molossus*, *Anthophagus luridus*, *Onitis sphinx*, *Aphodius analis* and *sorex*, *Euchlora viridis* and *chrysea*, *Anomala lævicollis*, *Popilio viridicærulea*, *Ancylonycha difficilis*, *Tetragona Chinensis*, and *Cetonia producta*. Of species belonging to other tribes of Coleoptera, we may name *Cistela punctata*, *Mylabris Schonherii* and *Cichorii*, and *Epicauta Chinensis*. Of the vast family of *Curculionidæ*, now known to amount to nearly 4000 species, China is comparatively unproductive. We shall merely name *Hypomeces squamosus*, *Macrocorynus discoideus* (?), and *Calandra longipes*. Of the long antenna tribes, *Aromia cyanicornis* and *Ceros-*

* Murray's Encyclopædia of Geography, p. 1030.

terna punctator, with many others, come from China, and the country also yields us several species of the splendid genus *Sagra*.

The unfortunate circumstances (formerly narrated) attending Lord Amherst's homeward voyage prevented Dr Abel from giving a detailed account of many insects which he had an opportunity of collecting at Tong-tcheou. His memory permitted him only to record in general, that *Scarabæus molossus* and *Cerambyx farinosus* frequented the corn-fields, and that the mole-cricket (*Gryllus gryllotalpa*), of a large size, entered the windows of the boats as soon as candles were lighted in the evening, and was occasionally found in the beds.* Various other orthopterous insects occur, and one of these is known to administer to the amusement of the natives. It is mentioned by Dobell† that when the Chinese wish to enjoy a *cricket-fight*, they place two males in an earthen bowl of six or eight inches in diameter. The owner of each tickles his own insect with a feather, which makes them run round the bowl in different directions, although they frequently meet and jostle each other as they pass. After several such meetings, they at last lose their temper, and erelong becoming greatly exasperated, they fight with such fury that *both* are literally torn limb from limb.

Various *Hemipterous* insects are found throughout the provinces. Some of these are annoying, from the constant stridulous sounds which they utter, especially a species of *cicada*, the music of which, says Sir George Staunton, was "not of the vocal kind, but produced by the motion of two flaps or lamellæ, which cover the abdomen or belly of the insect. It is the signal of invitation from the male to the female, which latter is quite unprovided with these organs of courtship."‡ It is indeed true, that its utterance is not of the vocal kind, but neither is that of any other insect. All insect-sounds are produced either by friction of one part of the body upon another, or by vibration of the wings. The insects in question (*Cicadæ*) seem among the most cosmopolite of their class, being found in every region of the earth, with the exception probably of the Arctic and Antarctic regions. They were famous among the Greek nations, and are commemorated by their poets under the name of τεττιξ,

* Abel's Journey, p. 127. † Travels in Kamtschatka.
‡ Staunton, vol. ii. p. 210.

—a term erroneously translated grashopper. This insect forms the subject of Meleager's beautiful invocation:—

> " O shrill-voiced insect! that with dew-drops meet,
> Inebriate, dost in desert woodlands sing;
> Perch'd on the spray-top with indented feet,
> Thy dusky body's echoings harp-like ring;"

And the poet's description is more accurate than that of the secretary of the embassy; for the sound, though aided by the lamellæ alluded to, is not produced by them. Sir George is however right regarding the quiet disposition of the females, although he had been anticipated also in that remark so long ago as the days of Xenarchus the Rhodian, who says,

> " Happy the cicadas' lives,
> Since they all have voiceless wives."

Of aquatic *Hemiptera*, the *Nepa grandis* of Fabricius may be mentioned as remarkable for its size, and as being common in collections from China. Of the lantern-flies, or luminous insects, the *Fulgora latèrnaria* is also very abundant. It is easily recognised by its long cylindrical snout, arched in an upward direction, its greenish reticulated elytra, and orange-yellow wings with black extremities. They are seen to glitter at night among the dark and leafy recesses of the forest-trees, or to flit with varied motions around their utmost branches, producing an effect so brilliant and so singularly beautiful as to seem almost the effect of magic.

The creature from which the *pe-la*, or white-wax of the Chinese, is derived likewise belongs to the hemipterous order. "The white-wax insect," says Mr Swainson, "deserves a more particular notice, as producing an important necessary of life. The perfect insect has been named by Fabricius *Cicada limbata*, but it is the larva which furnishes the substance itself. Sir George Staunton mentions them as insects not much exceeding the size of a fly, having very curious pectenated appendages, rising in a curve, and bending towards the head; the whole insect being covered with a white powder: this powdery substance is imparted to the stems of the plants, upon which these insects are found in thick clusters; it is then collected by the natives; hot vegetable oil is next applied, and the whole, when cold, coagulates, and becomes as firm as bees-wax. As a medicinal drug it is in high

estimation throughout China, and when made into candles, is reckoned superior for that purpose to bees-wax."*

Of the *Neuropterous* order, *Agrion Chinensis*, one of the smaller dragon-flies, remarkable for the dissimilar colour of its upper and under wings, affords a beautiful example; while of *Hymenopterous* insects, including wasps and bees, there are also many species.

The *Lepidopterous* insects of such a vast and varied country may be inferred with certainty to be extremely numerous, though they are as yet but slightly known. The butterflies of the mountain Lo-feou-shan, situate in the province of Quang-tung, are, according to Du Halde, "greatly esteemed." The largest and least common are sent to court, where they are used for a particular kind of ornament. "Their colours are wonderfully diversified, and lively to a surprising degree. These butterflies are much larger than those of Europe. In the day-time they are without motion on the trees, and consequently are easily taken; but in the night they flutter about much in the same manner as our bats, and many of them seem to be almost as large. There are others of a less kind much sought after, but no way comparable to these."† The large lepidopterous insects here alluded to, it is evident from their nocturnal habits, are not butterflies, as Du Halde calls them, but moths. The larger of the two is no doubt the great atlas-moth (*Bombyx atlas*), a species which, though it yields in *extent* to the magnificent owl-moth of Brazil (*Erebus strix*), the "glory of the *Noctuidæ*," as it is called by Kirby, is yet an insect of very striking aspect. It measures about nine inches across; the ground-colour is a rich and varied orange-brown, and in the centre of each wing there is a sub-triangular transparent spot, resembling a piece of talc or mica.

Of all the entomological productions of China (or of the world), the most important is assuredly the silk-worm, or larva of the *Bombyx mori*.‡ The natives rear these insects in small houses erected for the purpose, in the midst of the mulberry-plantations. This is done,

* Murray's Encyclopædia of Geography, p. 1029.

† Du Halde, vol. i. p. 21.

‡ We shall not dilate upon its general history, which is well known, nor repeat the account of its introduction to the European countries, which has been already given in a former volume of the Edinburgh Cabinet Library. See Account of British India, vol. iii. p. 151.

not only for the convenience of feeding, but for the sake of retirement, as they entertain the idea that even the barking of a dog would prove injurious. Many broods, however, are likewise brought into existence by the inhabitants of towns, who purchase mulberry-leaves from the cultivators of those trees. The eggs are allowed to be deposited on paper, and preserved till the period of hatching.* When that period arrives, the paper is moistened with a little water, and the young are speedily produced without the aid of artificial heat, although when an earlier supply than usual is required the atmosphere is warmed. The chrysalis is always deprived of life before the silk is unwound, by being exposed to the steam of boiling water, in a basket or perforated vessel. That nothing may be lost, it is afterwards not unfrequently eaten, as well as a white subterranean larva, and the caterpillar of a sphinx moth.†

According to Du Halde, the province of Shan-tung possesses a particular kind of silk, found in great quantities on trees and in fields. It is spun, and made into a stuff called *kien-tcheou*. It is produced by a caterpillar, which, however, does not construct an oval or rounded cocoon, like that of the common silk-worm, but very long threads. These threads, being driven by the winds, adhere to trees and bushes. The worms are not reared in a domestic state, and feed indifferently on the leaves of mulberry and of several other shrubs.‡

In regard to the *Dipterous* order, it has been found by painful experience that the low and sometimes marshy countries through which, for a great portion of their course, so many of the larger rivers flow, are but too favourable to the multiplication of those numerous winged insects of the gnat kind which pass their earlier stages in the water. Many of these were found extremely troublesome during Lord Macartney's embassy, chiefly on account of their stinging propensities, or, more correctly speaking, the wounds which they inflicted with their proboscis, while searching for their natural food,—the blood of man and beast.

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* In Italy they are usually deposited on cloths, from which they are detached by washing, and are hatched in a stoved room, of which the heat is gradually raised from 65° to 80° Fah.

† Staunton, vol. iii. p. 247.

‡ Du Halde, vol. i. p. 219, and vol. ii. p. 359.

We here close our sketch of the zoological productions of that vast empire, to the physical qualities of which we have drawn the attention of the reader; entertaining the sanguine hope that not many years will elapse without numerous additions being made to our knowledge of a subject at once so interesting and important.

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